

**ACL2640 Automated Tape Library
for DLT™ Cartridges**

Facilities Planning and Installation Guide

6207141-05

Ver. 5, Rel. 0

Quantum® | ATL

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA (DIGITAL APPARATUS) Interference-Causing Equipment Standard ICES-003 Issue 2

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CISPR-22 WARNING!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

ACHTUNG!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmassnahmen verantwortlich ist.

ATTENTION!

Ceci est un produit de classe A. Dans un environnement domestique, ce produit peut causer des interférences radioélectriques. Il appartient alors à l'utilisateur de prendre les mesures appropriées.

NOTICE FOR USA AND CANADA ONLY

If shipped to USA, use the UL LISTED power cord specified below for 100-120 V operation. If shipped to Canada, use the CSA CERTIFIED power cord specified below for 100-120V operation.

Plug Cap	Parallel blade with ground pin (NEMA 5-15P configuration)
Cord	Type: SJT, three 16 AWG (1.5 mm ²) or 18 AWG (1.0 mm ²) wires
Length	Maximum 15 feet (4.5m)
Rating	Minimum 10 A, 125 V

ATTENTION

LIRE LA REMARQUE DANS LE MODE D'EMPLOI.

REMARQUE

CETTE REMARQUE NE CONCERNE QUE LES ÉTATS-UNIS ET LE CANADA.

En cas d'envoi aux États-Unis, utiliser le cordon d'alimentation CERTIFIÉ UL et convenant pour 100-120 V.

En cas d'envoi au Canada, utiliser le cordon d'alimentation CERTIFIÉ CSA et convenant pour 100-120 V.

Fiche	Broches parallèles avec une broche de mise à la terre (configuration NEMA 5-15P)
Cordon	Type: SJT, trifilaire 16 AWG (1.5 mm ²) ou 18 AWG (1.0 mm ²)
Longueur	Maximum 15 pieds (4.5m)
Capacité	Minimum 10 A, 125 V

LASER STATEMENT

Class 1 Laser Product

CAUTION: With all panels and enclosures in place, this product is rated as a Class I laser product. The bar code scanner inside this product, however, is a Class II laser. Avoid exposure to the laser light emitted from the bar code scanner. Do not stare into the beam.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure.

Laser Klasse 1

VORSICHT: Dieses Produkt Enthdlt Einen Laser Der Kategorie II. Laserstrahlen - Der Strichcode-scanner Gibt Laserstrahlen aus. VERMEIDEN SIE jeden Blickkontakt und direkten kvrperlichen Kontakt mit diesen Strahlen.

VORSICHT: Ein nicht ordnungsgemd_er (siehe hier enthaltene Anweisungen) Einsatz bzw. Dnderungen der Betriebsleistung kvnnen einen gesundheitsgefdhrdenden Kontakt zur Folge haben.

Appareil à Laser de Classe 1

ATTENTION: Ce produit émet de la classe laser II. Rayonnement laser - NE PAS fixer des yeux le rayon. Éviter les expositions - Le rayonnement laser est émis à partir du lecteur optique de code barre.

ATTENTION: L'utilisation de contrôles ou d'ajustements de performance des procédures autres que ceux indiqués ici peut entraîner une exposition dangereuse.

Producto Láser de Clase 1

¡**ATENCIÓN!** Este producto contiene laser de clase II. Luz de laser - NO mire el rayo. Evite el contacto con la luz: la luz de laser se emite desde el explorador de código de barras.

¡**ATENCIÓN!** El uso de los controles o ajustes para realizar procedimientos que no son especificados puede provocar una situación peligrosa.

Luokan 1 Laserlaite

ATTENZIONE: Questo prodotto emette una luce laser di Classe II. NON guardare il fascio di luce ed evitare di esporsi alla fonte del laser. Il fascio di luce laser è emesso dal dispositivo di scansione del codice a barre.

ATTENZIONE: L'uso di comandi o regolazioni per eseguire le procedure che non siano quelli specificati in questa documentazione può causare rischi all'incolumità delle persone.

BATTERY STATEMENT

Caution

The Dallas Semiconductor DS1230AB-200 component on the robotic controller board inside this product contains a lithium battery. Lithium is a hazardous material that must be disposed of in accordance with local, state, and federal law.

Forsigtig

Båndbiblioteket indeholder et lithiumbatteri. Dallas Semiconductor DS1230AB-200 på robotkontrolltavlen indeholder et lithiumbatteri. Lithium kan anses for at være et sundhedsfarligt materiale. Kassér dette batteri i overensstemmelse med lokale og nationale lovbestemmelser.

Huomautus

Nauhakirjastossa on litiumparisto. Robottiohjainkortin Dallas Semiconductor DS1230AB-200-puolijohteessa on litiumparisto. Litium voidaan luokitella vaaralliseksi aineeksi. Pariston hävittämisessä on noudatettava viranomaisten antamia ohjeita ja määräyksiä.

Attention

La bibliothèque de bande contient une pile au lithium. Le Dallas Semiconductor DS1230AB-200 sur la carte robotique contrôleur contient une pile au lithium. Le lithium peut être considéré comme matériau dangereux. Jeter cette pile conformément aux lois locales, d'état et fédérales.

Achtung!

Die Bandbibliothek enthält eine Lithiumbatterie. Der Halbleiter Dallas Semiconductor DS1230AB-200 auf dem Roboter-Controller enthält eine Lithiumbatterie. Lithium gilt als Schadstoff. Bei der Entsorgung dieser Batterie alle entsprechenden kommunalen, staatlichen und bundesweiten Vorschriften beachten!

Attenzione

La libreria a nastro magnetico contiene una batteria al litio. Il semiconduttore Dallas Semiconductor DS1230AB-200 sulla scheda controller robotico contiene una batteria al litio. Il litio può essere considerato un materiale pericoloso. Eliminare queste batterie in conformità alle normative locali e statali vigenti.

Forsiktig

Kassettbiblioteket inneholder et litiumbatteri. Enheten Dallas Semiconductor DS1230AB-200 på robotkontrollkortet inneholder et litiumbatteri. Litium kan anses som et farlig materiale. Batteriet skal kastes i henhold til lokal og nasjonal lovgivning.

Precaución

La biblioteca de cintas contiene una pila de litio. El semiconductor Dallas Semiconductor DS1230AB-200 en el tablero controlador robotic contiene una pila de litio. El litio puede considerarse como un material peligroso. Deseche esta pila de acuerdo con las leyes municipales, estatales y federales.

Varning!

Magnetbandsbiblioteket innehåller ett litiumbatteri. Dallas Semiconductor DS1230AB-200 på robotstyrkortet innehåller ett litiumbatteri. Litium kan anses vara ett farligt material. Kassera detta batteri i enlighet med lokala och statliga lagar och förordningar.

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Preface

Audience

This document was written for Field Service Engineers (FSEs) of the ACL2540 Series Automated Tape Library (library). It describes facility preparation and provides the procedures for first-time installation of the library.

Purpose

This document provides information about the ACL2640 Series library including:

- library specifications
- site requirements
- unpacking and moving instructions
- installing the library

Document Organization

Following is a brief description of chapter contents.

- Chapter 1, “Library Site Requirements,” provides a description of the ACL2640 family of libraries, and provides flooring, power, humidity, and cabling requirements.
- Chapter 2, “Shipping and Handling,” provides shipping dimensions, and describes how to unpack and move the library to its final installation area.
- Chapter 3, “Installing the Library,” lists the tools required, and provides the procedures necessary for installing and testing the library prior to operation.

Notational Conventions

This manual uses the following conventions:

Caution: Cautions indicate potential hazards to equipment and are included to prevent damage to equipment.

Note: Notes emphasize important information related to the main topic.

Warning: Warnings indicate potential hazards to personal safety and are included to prevent injury.

This manual uses the following:

- Right side of the library — Refers to the right side as you face the component being described.
- Left side of the library — Refers to the left side as you face the component being described.
- *b* — All binary numbers are succeeded by “b.”
- *h* — All hexadecimal numbers are succeeded by “h.”
- Error or attention conditions are represented in parenthesis that translate as follows:

(SK=S ASC=AA ASCQ=QQ)

where:

S — hexadecimal sense key value

AA — hexadecimal additional sense code

QQ — hexadecimal additional sense code qualifier

Related Documents

Documents related to the ACL2640 library are shown below:

ATL ACL2640 Documentation

Document No.	Document Title	Document Description
6207140	<i>ACL2640 Operator's Guide</i>	This guide defines the control functions, operational procedures and end user maintenance procedures for the library.
6207144	<i>ACL2640 Diagnostic Software User's Manual</i>	This manual describes how to install and use the Diagnostic Software Package developed for field service personnel.
6207145	<i>IOD Installation Instructions</i>	This manual describes how to install the Inport / Outport Device (IOD).
6207147	<i>ACL2640 Cabinet-to-Cabinet Mounting Instructions</i>	This manual describes how to install a multi-unit library system.
EK-TH4XX-IM	<i>DLT 2000 Cartridge Tape Drive Product Manual</i>	This document describes the DLT™2000 tape drive and provides operating instructions and troubleshooting procedures.
81-108336-01	<i>DLT 4000 Cartridge Tape Drive Product Manual</i>	This document describes the DLT™4000 tape drive and provides operating instructions and troubleshooting procedures.
81-60000-01	<i>DLT 7000 Cartridge Tape Drive Product Manual</i>	This document describes the DLT™7000 tape drive and provides operating instructions and troubleshooting procedures.

Refer to the appropriate product manual(s) for information about your tape drive and cartridges.

SCSI-2 Specification

The SCSI-2 communications specification is the proposed American National Standard for information systems, dated March 9, 1990. Copies may be obtained from:

[Global Engineering Documents](#)
15 Inverness Way, East
Englewood, CO 80112
(800) 854-7179 or (303) 397-2740

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Chapter 1

Library Site Requirements

This section addresses the floor and electrical requirements of the site.

Library Description

The ACL2640 family of library products are automated tape libraries for Digital Linear Tape (DLT™) cartridges. Each library stores from 88 to 264 cartridges and accommodates three to nine DLT 2000, DLT 4000, or DLT 7000 tape drives. Table 1 describes the ACL2640 product family and its configuration options.

Table 1 ACL2640
Product Family

Library Model No.	Library Part No.	Number of Drives	Available Drive Types	Standard SCSI Configuration	Cartridge Capacity
ACL2640	6200206	3	DLT 2000 DLT 4000 DLT 7000	4-Bus	264
ACL 6/176	6200220	6	DLT 2000 DLT 4000 DLT 7000	6-Bus	176
ACL 6/176 (A)	6200220	3 (option to add 3)	DLT 2000 DLT 4000 DLT 7000	6-Bus	176
ACL 9/88	6200230	9	DLT 2000 DLT 4000 DLT 7000	9-Bus	88
ACL 9/88 (A)	6200230	3 (option to add 6)	DLT 2000 DLT 4000 DLT 7000	9-Bus	88
ACL 9/88 (B)	6200230	6 (option to add 3)	DLT 2000 DLT 4000 DLT 7000	9-Bus	88

All three models of DLT tape drives are identically mounted and cabled in the libraries. Table 2 lists the differences between the three types of DLT tape drives.

Table 2 DLT Tape Drives

Model Number	Native Mode		With 2:1 Compression	
	Transfer Rate	Capacity	Transfer Rate	Capacity
DLT 2000	1.25 Mbytes/s	10 Gbytes	2.5 Mbytes/s	20 Gbytes
DLT 4000	1.5 Mbytes/s	20 Gbytes	3.0 Mbytes/s	40 Gbytes
DLT 7000	5 Mbytes/s	35 Gbytes	10 Mbytes/s	70 Gbytes

The library is driven by a host computer using the SCSI-2 standard robotics command set. The basic library uses a SCSI or EIA/TIA-574 (RS-232 for 9-pin connector) serial link to communicate with the host computer. The multi-unit controller (MUC) allows up to five units to be linked together and driven by a single host. The pass-through mechanisms (PTMs) transfer cartridges between units.

The library has a front door that can be opened for easy bulk loading of bin packs, each containing a maximum of 11 DLT cartridges. The inport/output device (IOD) allows single cartridges to be transferred in and out without interrupting the library operation.

Figure 1 and Figure 2 show the dimensions and major components of the library. Each library contains robotics, bin packs of cartridges, and tape drives. The bin packs are arranged on an eight-sided carousel. ACL2640 libraries have three tape drives and three bin packs per carousel face. ACL 6/176 libraries have six tape drives and two bin packs per carousel face. ACL 9/88 libraries have nine tape drives and one bin pack per carousel face. Each bin pack can hold eleven DLT cartridges. A bar code reader is provided for quick and accurate cartridge inventories.

Tape drives are mounted in the housing above the carousel and in line with the carousel front face. A gripper moves horizontally on an extension axis which in turn is attached to vertical rails in the front door.

DLT cartridges are moved from the carousel to the tape drives and back via the vertical axis, extension axis and gripper. All robotics motion and tape drive operation is under control of the host computer.

Figure 1 Library Front
View

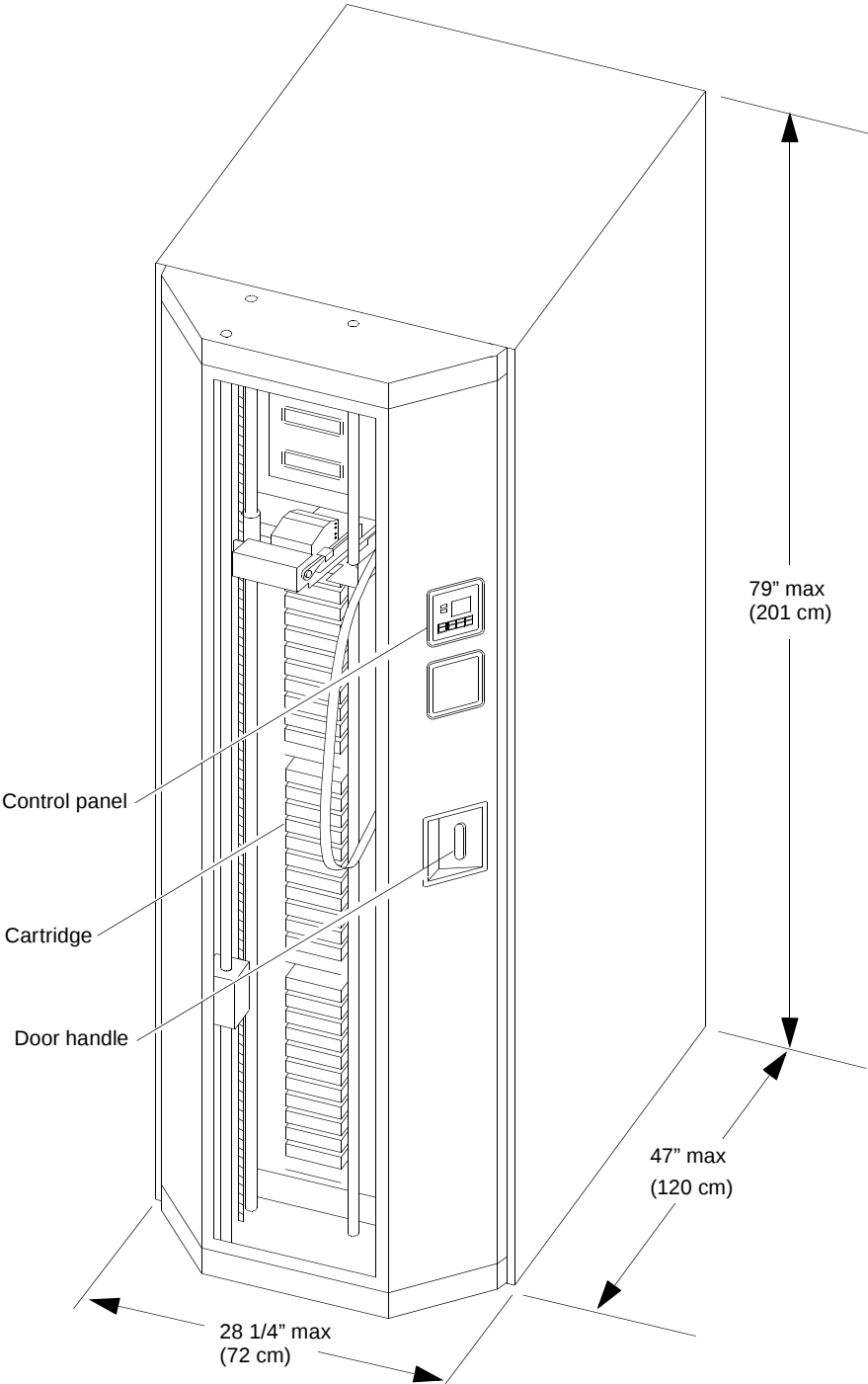


Figure 2 Library With Door
Open

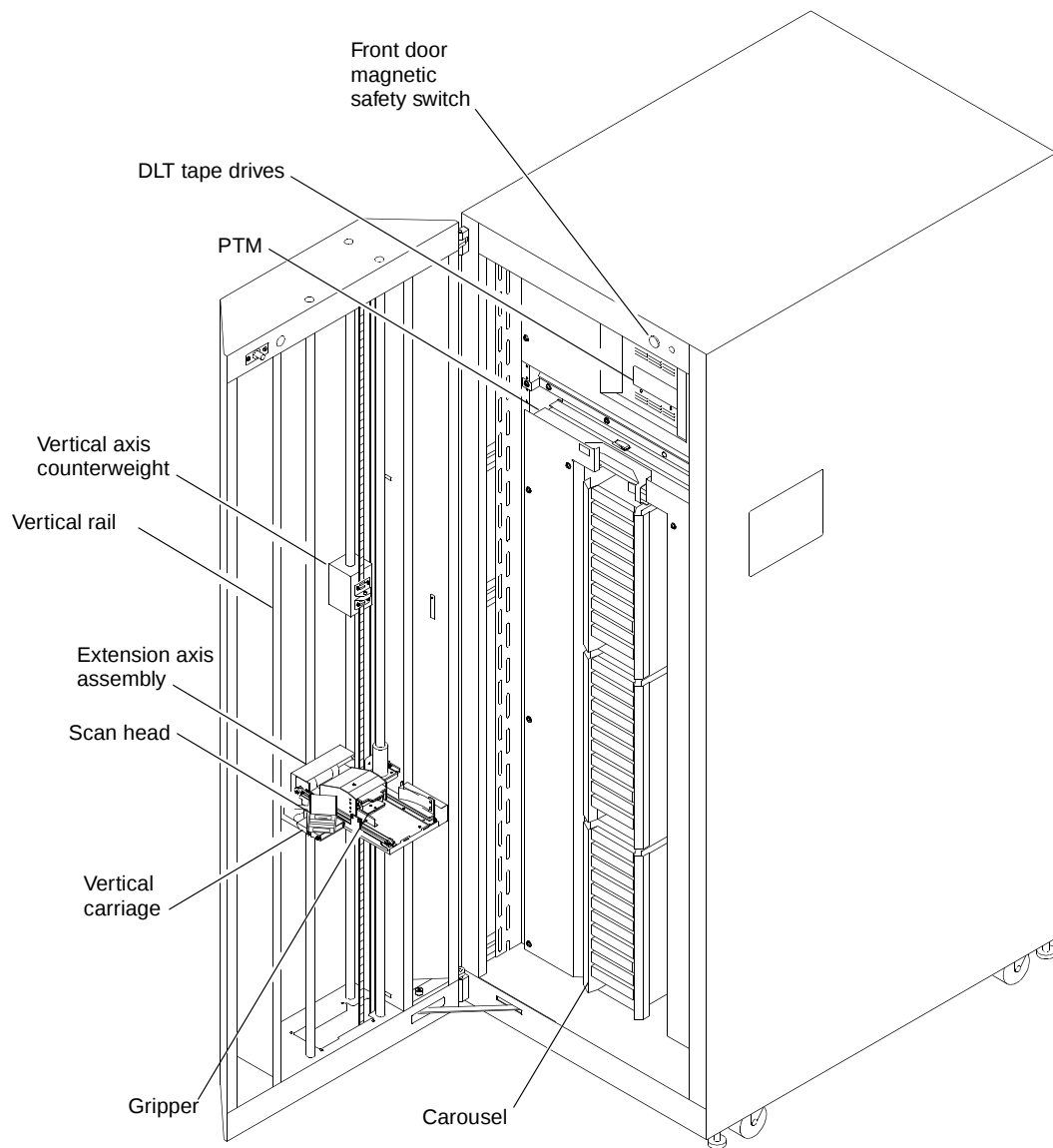
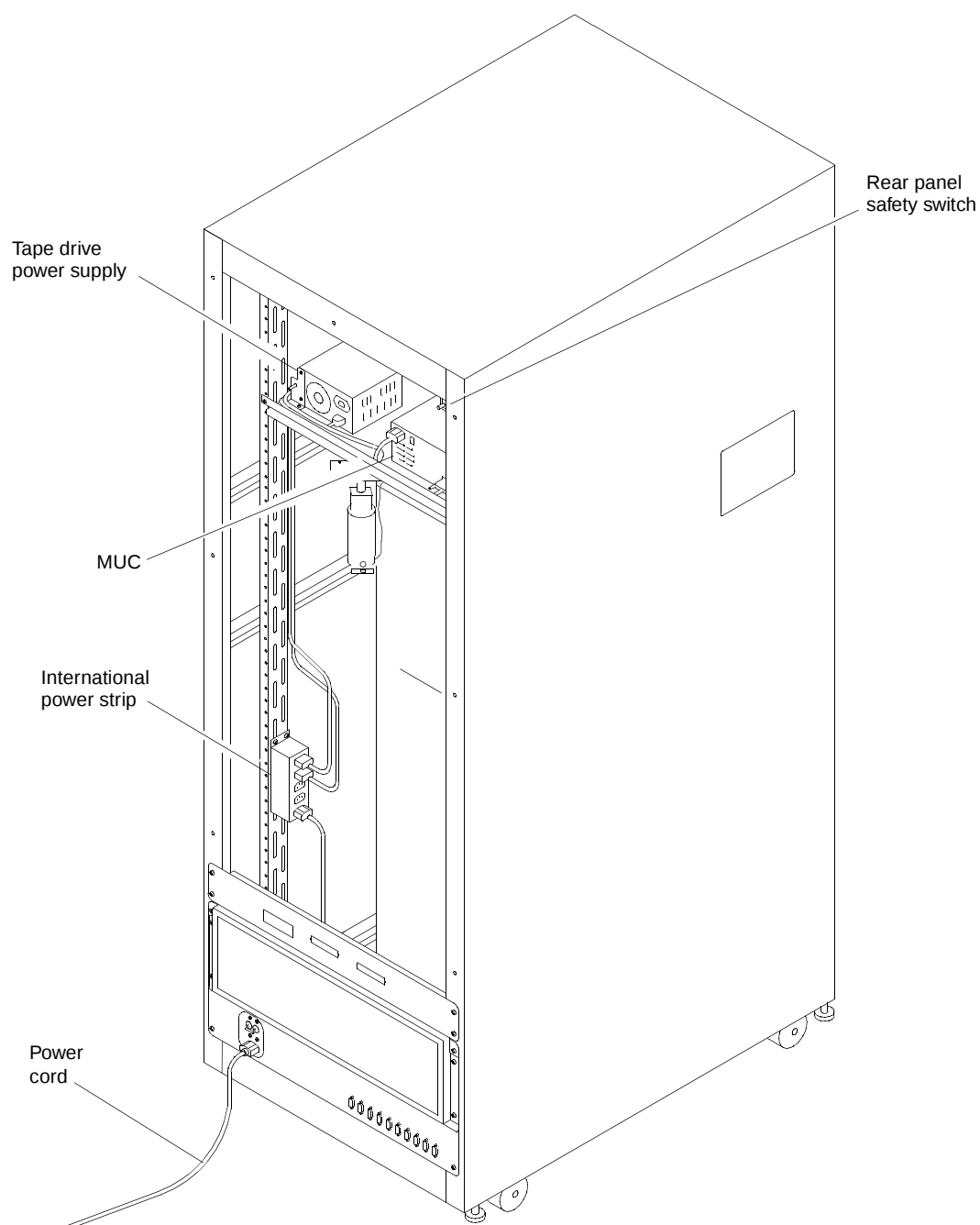


Figure 3 Library Rear View



Floor Space Requirements

Single Unit

The minimum floor space requirement for a library is shown in Figure 4. Space needs to be allocated around the cabinet for access by an operator or service person.

Figure 4 Single-Unit Floor Layout

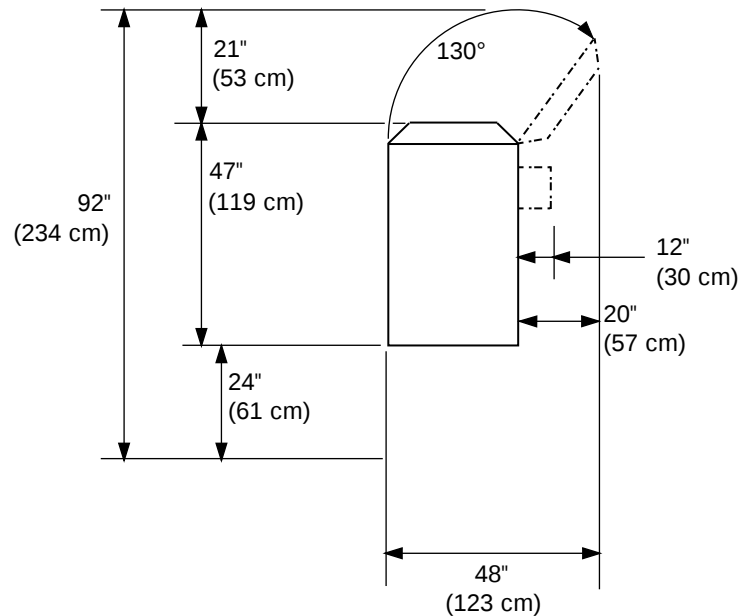


Table 3 Single-Unit Floor Space Requirements

Requirement	Floor Space Description and Location
21" (53 cm)	In front of the cabinet for the front door to open.
20" (51 cm)	Additional space needed to allow the door to open to its full 130 degrees.
24" (61 cm)	Allows adequate air circulation for cooling the library.
12" (30 cm)	On the left side of the cabinet for IOD placement.

Multiple Units

The minimum floor space requirement for the multi-unit configuration is shown in Figure 5. Space needs to be allocated around the cabinets for access by an operator or service person.

Figure 5 Multi-Unit Floor
Layout

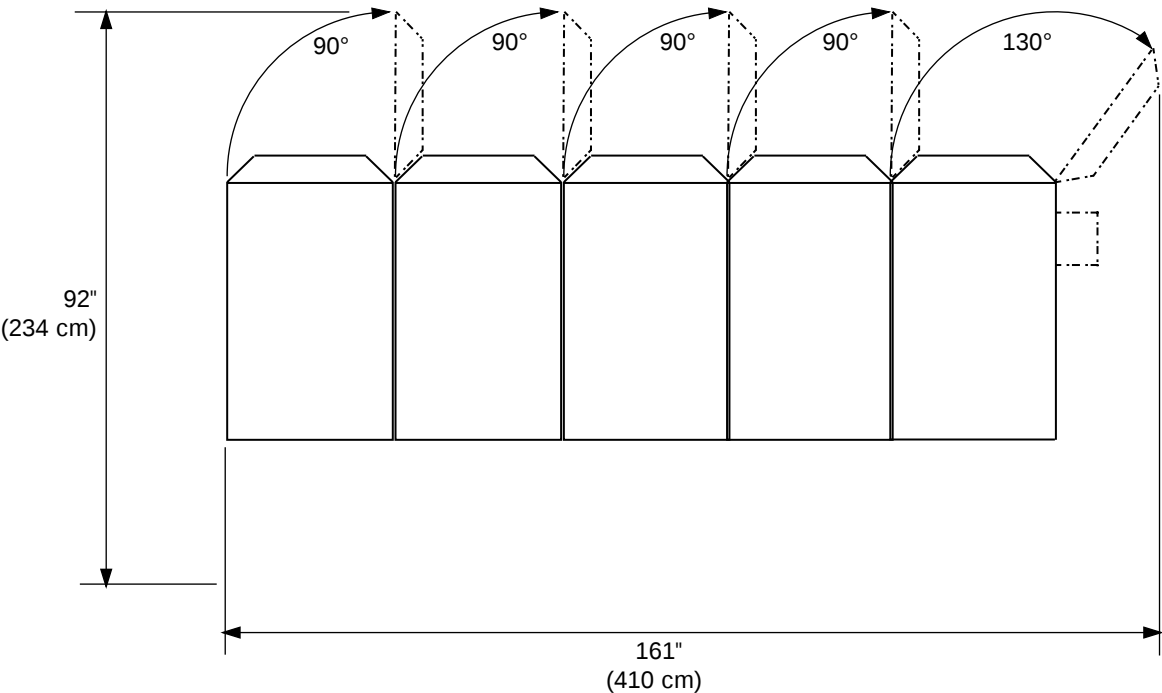


Table 4 Multi-Unit Floor
Space Requirements

Requirement	Floor Space Description and Location
161" x 92" (410 x 234 cm)	Space required to accommodate five units in addition to the extra space needed for the IOD and to provide for opening the left-most front door to 130°.

Floor Type

Any type of flooring is acceptable for the library as long as the following guidelines are taken into consideration:

- The floor must be reasonably level, not too compliant, and capable of supporting the weight of single or multi-unit configurations, such as typical computer room false flooring.
- Carpeted flooring must have antistatic mats for each library and work areas at the front and rear of each unit. The antistatic mat, carpeting, and padding combined should not compress more than the library unit ground clearance of 0.75" (19 mm) (measurement taken to the bottom of the leveling feet when they are fully raised).

- If multiple units are to be attached, the floor must be reasonably flat to accommodate attachment and alignment of the units in a series.

Floor Loading

The floor must be able to support the full weight of a loaded cabinet. For sizing purposes, the combined weight includes the following:

- 800 lb. (360 kg) for the library.
- 132 lb. (60 kg) for the tape cartridges.

The weight is distributed on either the four casters or the four feet of the unit.

Floor Clearance

The cabinet has a nominal floor clearance of 0.75" (19 mm).

Note: Do not attempt to move the library on carpeting that depresses more than the nominal clearance.

Place stiff plastic or rubber mats on top of carpet prior to rolling the unit over it.

Doorway Clearance

The crated library dimensions are 84 1/4" high by 38 1/4" wide by 56 1/4" deep. Uncrate the library in your facility's shipping/receiving area for easier movement to its installation location.

Warning: Do not tilt the unit more than 10 degrees.

The uncrated library dimensions are 79" high by 28 1/4" wide by 47" deep (201 x 72 x 120 cm). Make sure that the hallways, doorways, and rooms have adequate clearances.

Since the library is 79" (2.01 m) high, it will clear a typical doorway when being moved on its own casters.

The cabinet is best able to go over inclines and door jams when it is pushed from the front. When rolling the unit over cracks and door jams, a sheet of stiff metal placed over the crack or door jamb may help it roll more easily.

Any side can be used to push the library, however, the preferred way is from the front or back. Special care should be taken to avoid pushing on the non-structural portions, which are the:

- Front door control panel
- System integrator panels
- Front door view window
- Front door handle
- Rear connector panel
- System integrator panel
- Rear access panel

Power Requirements

AC power requirements for one library with an IOD and three tape drives is ~120VAC, 10A, 60 Hz nominal or ~230V, 5A, 50 Hz nominal.

The library does not supply spike suppression or power factor correction. The unit needs to be on a power bus separate from any equipment which can cause large inrush currents (such as heavy manufacturing equipment).

The power distribution box contains a 10A breaker (medium time-delay, magnetic, two pole) for overload protection of robotics branch outlets.

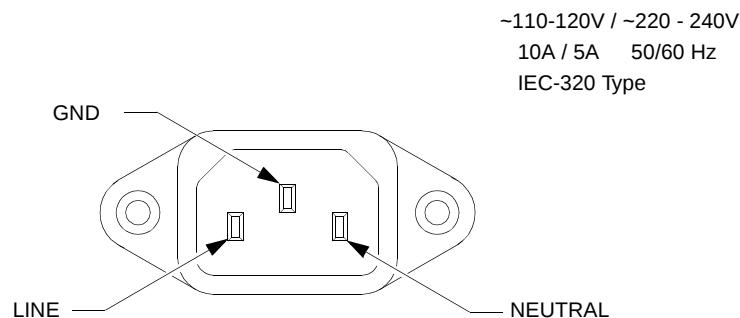
The library's autoranging motor and logic power supplies will accept single phase, 90 - 264VAC input power at 47 to 63 Hz. The fans are switchable between ~120V and ~230V via a voltage selection switch on the power distribution box.

The power inlet connector is a IEC-320 connector. For international applications you must replace the power cord set with a harmonized 3x2.0mm² power cord set that is approved by the country where used.

The IEC-320 connector for connecting to a ~120V, 10A, 60 Hz line or a ~230V, 5A, 50Hz line extends through the rear connector panel on each library.

Warning: The library must be connected to an AC outlet that is properly grounded.

Figure 6 Library AC Power Receptacle



Humidity Requirements

For operation of the library, the room humidity must be kept between 30% and 85%, noncondensing. Refer to the specifications for the tape drives and cartridges for information about their humidity requirements.

Cabling

Host Computer Communications

Two types of communications are possible to the host computer: EIA / TIA-574 serial (RS-232 for 9-pin connectors) and Small Computer Systems Interface (SCSI). Either method, when used with a Multi-Unit Controller (MUC), allows a single cable from the host computer to control up to five units.

If the Multi-Unit Single Lun (MUSL) option is enabled (via the Diagnostic Software “CONFIG” menu), the set of units operate as a single library from the host perspective, with no distinction made between the component units.

SCSI Communications with a MUC

Multi-unit configurations and single-unit configurations can use SCSI commands to communicate with the host.

Multi-Unit Configuration

Using SCSI communications, both control and data signals are transmitted on the same SCSI cable.

Note: Host-to-library SCSI cables are not supplied with the library.

ACL2640 libraries with DLT™2000 and DLT™4000 tape drives installed have four 50-pin Centronics SCSI ports labelled: SCSI PORT A, SCSI PORT B, SCSI PORT C, and SCSI PORT 1. See Table 5 and Figure 7 on page -14.

ACL2640 libraries with DLT™7000 tape drives installed have three 68-pin Micro-D SCSI ports labelled: SCSI PORT A, SCSI PORT B, and SCSI PORT C. See Table 6 and Figure 8 on page -15.

ACL 6/176 SCSI addressing and cabling is shown in Table 7 and Figure 9 on page -16. ACL 9/88 SCSI addressing and cabling is shown in Table 8 and Figure 10 on page -17.

Table 5 ACL2640 SCSI Port/ID - DLT 2000/DLT 4000 Drives

Library SCSI Port	Device	SCSI ID
1	MUC	2
C	Drive 2 (top)	5
B	Drive 1 (middle)	4
A	Drive 0 (bottom)	3

Figure 7 ACL2640 SCSI
Cabling - DLT 2000/DLT
4000 Drives

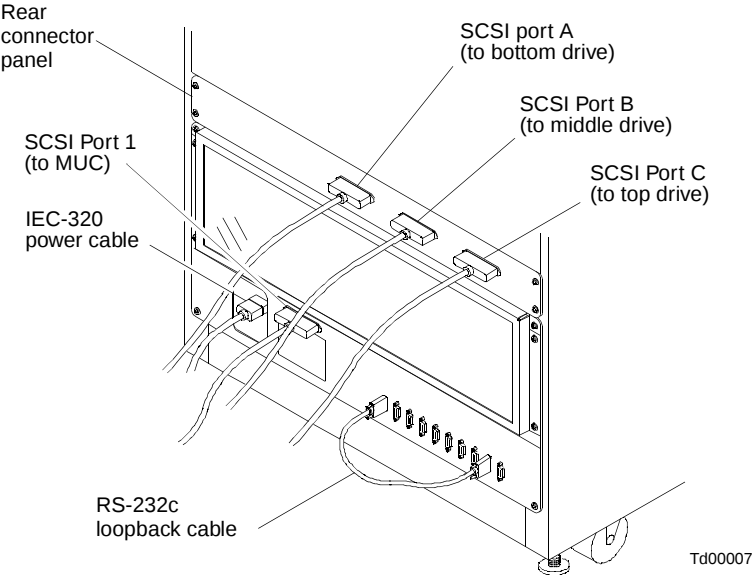


Table 6 ACL2640 SCSI
Port/ID - DLT 7000 Drives

Library SCSI Port	Device	SCSI ID
C	MUC	2
	Drive 2 (top)	5
B	Drive 1 (middle)	4
A	Drive 0 (bottom)	3

Note: The MUC and drive 2 are daisy-chained together and connected to SCSI port C.

Figure 8 ACL2640 SCSI
Cabling - DLT 7000 Drives

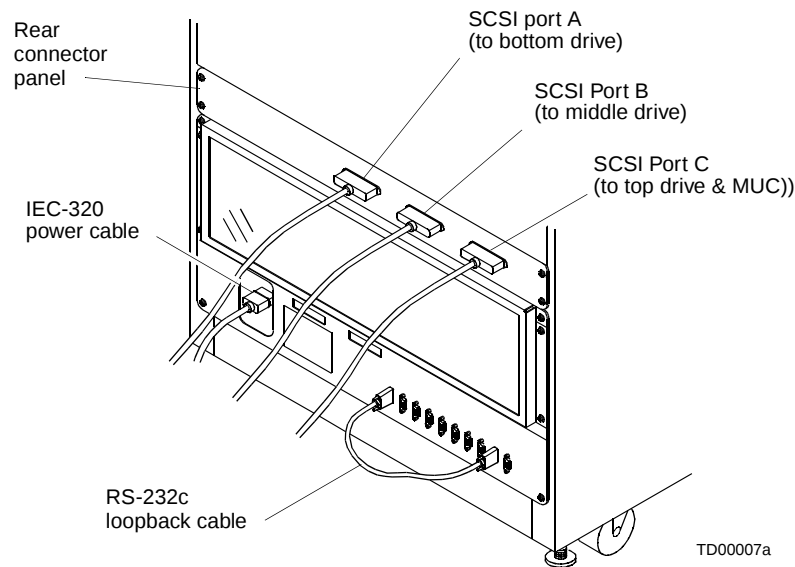


Table 7 ACL 6/176 SCSI
Port/ID - All DLT Drive
Types

Library SCSI Port	Device	SCSI ID
D	MUC	2
	Drive 5 (top)	5
E	Drive 4	4
F	Drive 3	3
A	Drive 2	5
B	Drive 1	4
C	Drive 0 (bottom)	3

Note: The MUC and drive 5 are daisy-chained together and connected to SCSI port D.

Figure 9 ACL 6/176 SCSI
Cabling - All DLT Drive
Types

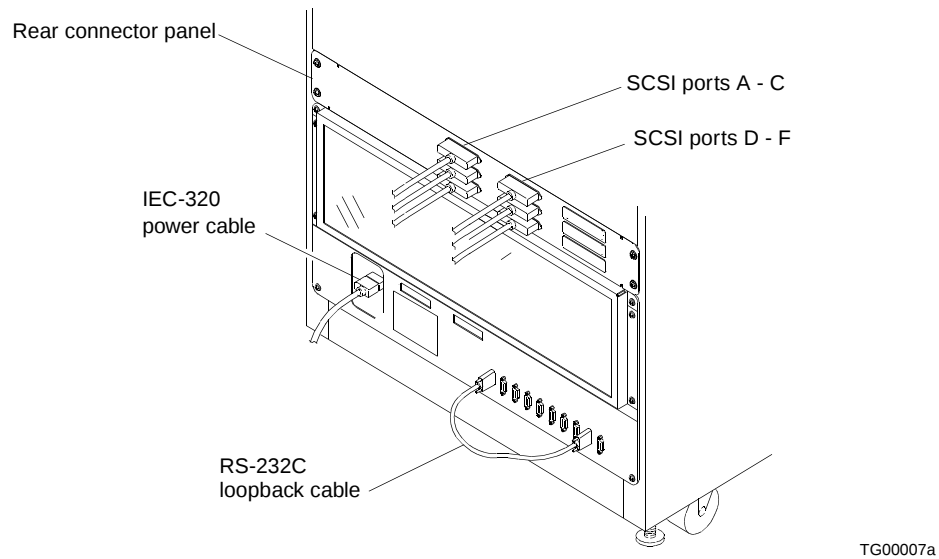
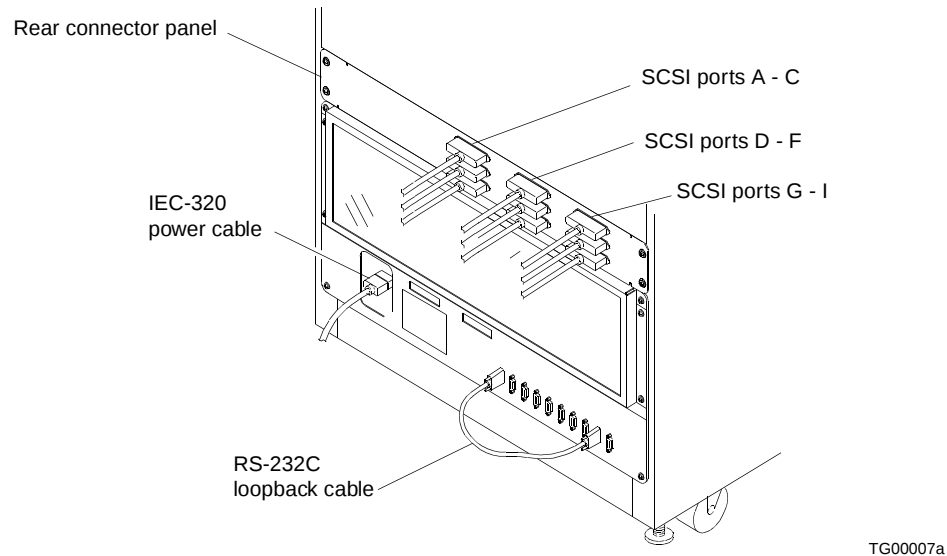


Table 8 ACL 9/88 SCSI
Port/ID - All DLT Drive
Types

Library SCSI Port	Device	SCSI ID
G	MUC	2
	Drive 8 (top)	5
H	Drive 7	4
I	Drive 6	3
D	Drive 5	5
E	Drive 4	4
F	Drive 3	3
A	Drive 2	5
B	Drive 1	4
C	Drive 0 (bottom)	3

Note: The MUC and drive 8 are daisy-chained together and connected to SCSI port G.

Figure 10 ACL 9/88 SCSI
Cabling - All DLT Drive
Types



Single-Unit Configuration

For stand-alone units an RS-232 loop-back cable must be connected to the rear connector panel (see Figure 7 on page -14). The loop-back cable connects the MUC to the robotics control electronics.

SCSI Cabling

The library uses a 5MHz clock rate and the following SCSI cable connections:

- Libraries with DLT 2000 or DLT 4000 tape drives use SCSI cables with 50-pin Centronic type connectors.
- Libraries with DLT 7000 tape drives use SCSI cables with 68-pin Micro-D type connectors.

For reliable operation, all SCSI cabling and connectors must be shielded. This protects the bus integrity as well as minimizing electromagnetic interference emissions.

For information on connecting the SCSI cables to the library, see Chapter 4. For a more detailed description of library SCSI connection options, refer to the *ACL2640 Software Interface Guide*.

The communications protocols and robotic command set for the library are based on the SCSI-2 specifications. See the SCSI-2 specifications and the *ACL2640 Software Interface Guide* for more information.

**Serial
Communications**

When using serial communications, two cable connections are required between the library and the host computer:

- An EIA / TIA-574 serial cable is used for control communications between the host computer and the library,
- A separate SCSI cable is used for data flow between the host computer and the tape drives within the library.

The serial cable is connected from the host computer directly to the library. The SCSI cable is connected as described in “SCSI Communications with a MUC.”

Note: A host-to-library serial cable is not supplied with the library.

The shielded serial connection between the host and the library uses only three wires. The library has a female 9-pin D-type connector on the rear connector panel for this purpose. The pinouts for the connector are listed in table 9. The baud rate for host/library communication is 9600.

Note: MUC switch SW1 position 7 (see figure 1 on page 4) must be up for serial communication.

Chapter 2

Shipping and Handling

This section addresses shipping and handling information for the ACL2640 library.

Shipping Considerations

This section describes shipping a library, unpacking it, moving it to its final destination, and preparing it for further shipping. Be sure to read this entire section before attempting to unpack or move the unit.

Note: The procedures listed below must be performed in the order that they appear in this chapter.

Crated Dimensions

The crated cabinet has dimensions of 84 1/2" high by 38 1/4" wide by 56 1/4" deep (215 x 97 x 143 cm). When moving the library, ensure the hallways, doorways and rooms have adequate clearances.

Uncrated Dimensions

The uncrated cabinet has maximum dimensions 79" high by 28 1/4" wide by 47" deep (201 x 72 x 120 cm). When moving the library, ensure the hallways, doorways, and rooms have adequate clearances.

Uncrating the Library

To uncrate the library, use the procedure listed below and refer to Figure 11.

Note: Save all crating and packaging material for possible later use.

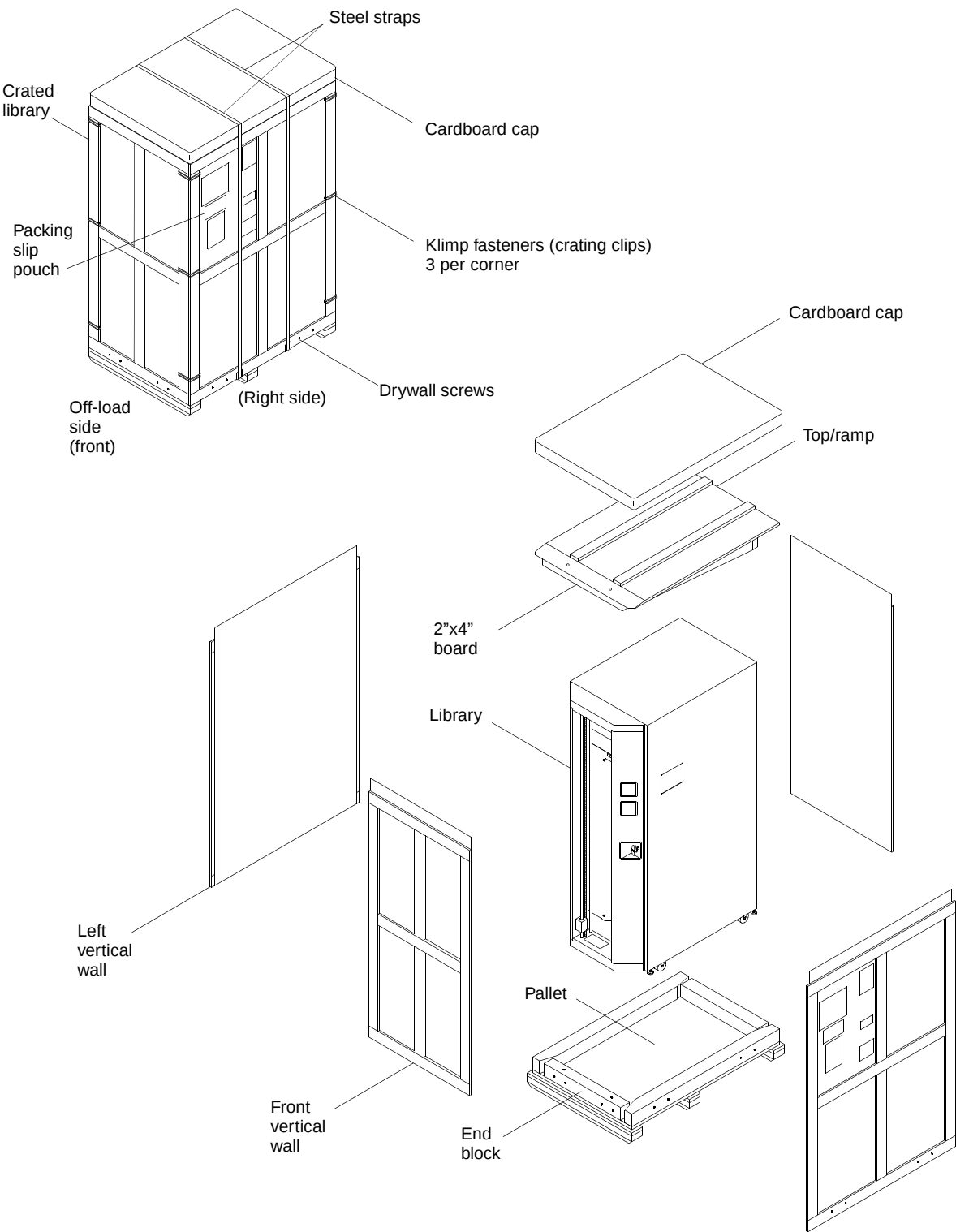
- 1 Move the crated equipment to a level area and allow a minimum of 6' in front of the off-load side of the crate. (Observe that the packing slip pouch is located on the right side of the crate. Also, the distance of 6' ensures that there is enough room to set up the ramp and remove the library from the pallet.)

Warning: Exercise care when cutting the steel straps that secure the library and crating material to the pallet. These straps are under tension and will snap away when cut.

Caution: This procedure requires at least two people.

- 2 Cut all steel straps securing the library and crating material to the pallet.
- 3 Lift the cardboard cap up and off the top / ramp.
- 4 Lift the top / ramp up and off the library top.
- 5 The crate has four separate vertical walls. Choose one wall and remove the three Klimp Fasteners (crating clips) from one of its corners.
- 6 At the opposite corner of the same wall, remove the other three crating clips.
- 7 At the bottom of the same wall, remove the four drywall screws securing this wall to the pallet.
- 8 Repeat steps 5, 6, and 7 for the other three walls.
- 9 Verify that the contents of the crate match the contents of the packing slip.

Figure 11 Uncrating the Library

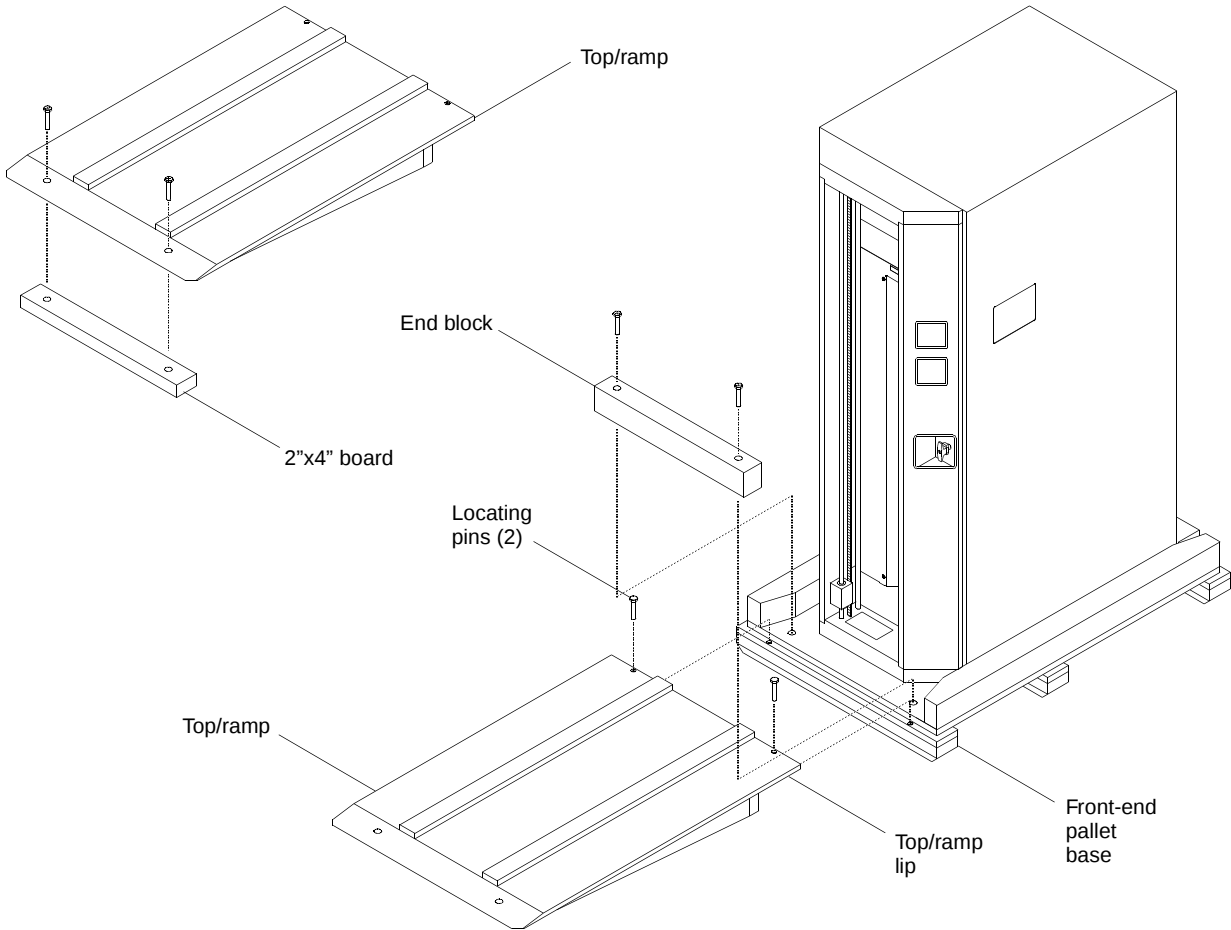


Connecting the Top/Ramp to the Pallet

Figure 12 shows how to set up the library top / ramp.

- 1 At the front of the top / ramp, remove the two hex-head screws securing the 2"x4" board to the top / ramp and remove the board.
- 2 Remove the two lag screws that attach the end block to the pallet and remove the end block.
- 3 Remove the two locating pins from the right side block of the pallet.
- 4 Rest the top / ramp lip on the front end of the pallet base.
- 5 Align the sides of the top / ramp flush with the sides of the pallet base.
- 6 Place the two locating pins through the top / ramp and into the front-end of the pallet base to securely connect the ramp to the pallet.

Figure 12 Connecting the
Top/Ramp to the Pallet



Removing the Library from the Pallet

Warning: The library weighs approximately 800 lbs without cartridges. At least two people are required to move it. One person should push while the other person guides the cabinet.

- 1 Verify that the leveling feet (located on the underside of the cabinet at the four corners) are fully retracted. If the feet are not fully retracted, do the following:
 - Remove the lip from the rear of the bottom pallet and raise the back feet by turning them clockwise until they are fully retracted.
 - Repeat the same procedure for the front feet.
-

Warning: Do not tilt the unit more than 10 degrees.

- 2 With one person on the ramp in front of the cabinet to control the speed, and one person pushing from the rear, slowly roll the cabinet down the ramp and onto the floor. When pushing the cabinet from the front, press against the angled sections on the outer portions of the front door.
-

Caution: Any one side of the cabinet can be used to push the library, however, the preferred way is from the front or back. Special care must be taken to avoid pushing on the following non-structural portions of the cabinet:

- Front door control panel
 - Front door view window
 - Front door handle
 - Rear access panel
- 3 Once the library is on the floor, it can be moved to its final destination.

Note: The library has a nominal floor clearance of 0.75" (19 mm). Do not attempt to move the library on carpeting that depresses more than the nominal clearance. Place stiff plastic or rubber mats on top of carpet prior to rolling the library over it. The floor clearance also imposes a restriction on how sharply the floor can begin to angle up, as it does when transitioning to a ramp.

Moving the Library to its Final Destination

Warning: The library weighs approximately 800 lbs without cartridges. At least two people are required to move it. One person should push while the other person guides the cabinet.

The cabinet transitions over inclines and door jambs best when it is pushed from the front.

Note: When rolling the cabinet over floor cracks and door jambs, place stiff plastic or mats over the floor crack or door jamb to help it roll more easily.

Caution: Any one side of the cabinet can be used to push the library, however, the preferred way is from the front or back. Special care must be taken to avoid pushing on the following non-structural portions of the cabinet:

- Front door control panel
- Front door view window
- Front door handle
- Rear access panel

Note: Always move the library up and down ramps backward to minimize the effective distance between the front casters and the front door.

Warning: Do not push the cabinet up or down a ramp with an incline greater than 10 degrees.

Since the cabinet has casters for moving the library and feet for holding it in position, check the feet prior to moving the library. The feet are located on the underside of the cabinet at the four corners. If the feet are not fully retracted, do the following:

- 1 Rotate each of the four feet clockwise until they are fully retracted.
- 2 Roll the library to its final destination.

Removing Constraint Packaging

Once the library has been moved to its final destination, do the following:

- 1 Remove the outer cellophane wrapping and cardboard protecting the library.
- 2 Open the front door and remove the eye-bolt, located at the top of the library door. Store the eye-bolt for reshipment.
- 3 Remove the accessories box from inside and at the base of the front door.
- 4 Remove the tie-wraps marked by yellow flags. The flagged tie-wraps can be found restraining the vertical belt and IOD cables.

Note: The tie-wraps may be removed by using diagonal cutters. Tie-wraps will be required to immobilize the robotics during reshipment.

- 5 Remove the tie-wraps that hold the bin packs in place.

Caution: Note that the bottom bin pack on each face of the carousel has been turned upside down for shipping purposes.

- 6 Before loading cartridges, turn the bottom bin pack on each face of the carousel right side up.

Note: Make sure the cartridge retention springs (metal pieces located on the sides of the bin packs) are properly positioned.

Crating the Library for Reshipment

Before moving the library, perform the following steps:

- 1 Remove all cartridges from the bin packs, tape drives and PTM.
- 2 Remove the IOD if installed.

Securing the Bin Packs for Reshipment

To secure the bin packs for reshipment:

- 1 Turn the bottom bin pack on each face upside down before installing tie-wraps.
- 2 Secure the bottom 2 bin packs together using tie-wraps. Refer to Figure 13 on page -30 for details.

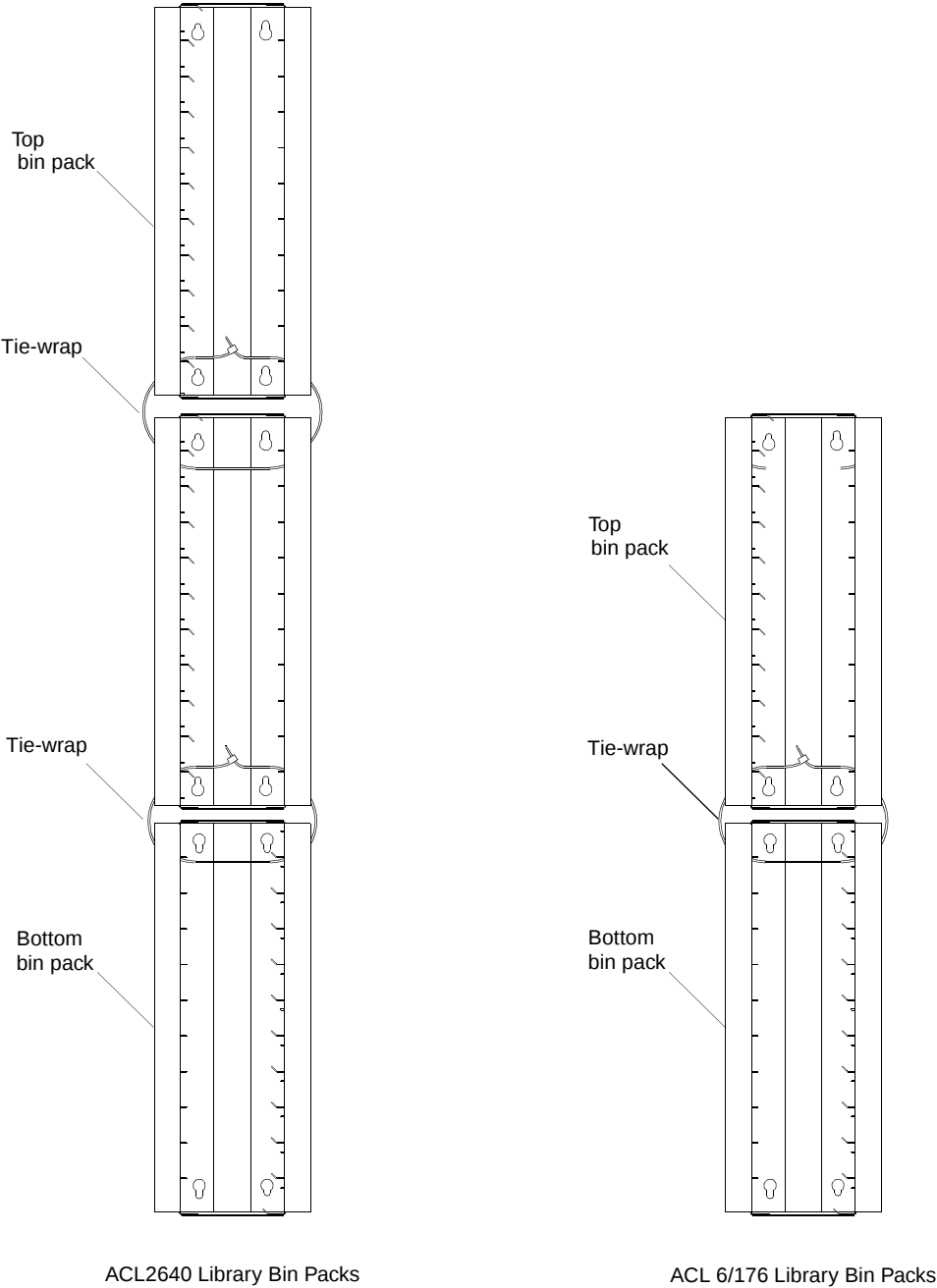
Note: Route the tie-wraps through the bin pack slots as shown in Figure 13, use the 2nd slots.

Caution: Route the tie-wraps towards the front of the bin pack slots to prevent potential damage to the springs.

Caution: Tighten the tie-wraps so that bin packs do not come loose during shipment, but DO NOT overtighten.

- 3 For ACL2640 libraries secure the top 2 bin packs together using tie-wraps. Refer to Figure 13 on page -30 for details.

Figure 13 Securing the Bin Packs



Completing the Crating Procedure

To complete the crating procedure:

- 1 Use tie-wraps to restrain the vertical belt and IOD cables. Place the vertical belt tie-wrap around both sides of the vertical belt and tighten it so that the belt teeth are securely interleaved. The counterweight should be resting at the bottom of the door.
- 2 Mount the eye-bolt at the top of the library door and restrain the free end of the vertical carriage to the eye-bolt.
- 3 Retract the feet of the cabinet (located on the underside of the cabinet at the four corners) so they do not cause obstruction when the unit is being moved. Tighten them clockwise to approximately 20 in-lb. (2.3 N-m) to assure that they are fully retracted.
- 4 Place protective material on the front window, such as cardboard over the front to protect the window, door, and front cabinet corners, and shrink-wrap to hold everything securely in place.
- 5 Perform the procedure “Removing the Library from the Pallet” in reverse order to place the library on the pallet.
- 6 Perform the procedure “Connecting the Top / Ramp to the Pallet” in reverse order to detach the top / ramp from the pallet.

Warning: It is recommended that the steel straps be tightened to approximately 200 lbs of tension.

Warning: Keep the unit upright when moving. Do not tilt it more than 10°.

- 7 Perform the procedure “Uncrating the Library” in reverse order to crate the library for reshipment.

Chapter 3

Installing the Library

This chapter addresses the procedures for installing the ACL2640 library.

Installation Tools

- A 3/4" open-end wrench for adjusting the leveling feet, and a level are required for leveling the cabinet.
- A 32 oz. force gauge is required for checking the vertical axis belt tension.
- A flashlight and standard tools, such as screwdrivers, nutdrivers, wrenches, scales, and allen wrenches are also needed.
- A personal computer (PC) with diagnostic software is required to perform powered testing of the library.
- An alignment tool kit is required to align and calibrate the extension axis relative to the carousel and tape drives.

Host Computer

The customer is expected to furnish the host computer to be used with the library. This also includes furnishing the host communications cabling.

The library has been designed to easily attach to most computers. All host computers need a SCSI communications interface to transfer data to and from the tape drives. The library robotics can be driven from the host using SCSI communications or a low-speed EIA / TIA-574 serial interface (RS-232 for 9-pin connectors) readily available on most computers.

On systems without a direct SCSI interface, external communications bus converters may be used.

Diagnostic PC and Software

An IBM-compatible personal computer (PC) is required for running the field engineer's diagnostic software. Diagnostic software for testing the correct operation of each library is available. An EIA / TIA-574 serial cable (RS-232 for 9-pin connectors) is needed for connecting the PC to the library diagnostic port.

The *ACL2640 Diagnostic Software User's Guide* provides detailed instructions on using the FE diagnostic PC to check out the library. It is essential for this checkout procedure.

Installing the Library

Caution: A trained, authorized FSE is required to install a library. The procedures listed below must be performed in the order that they appear in this section.

Positioning the Library

For installation, it is recommended that the library be placed in an area with plenty of clearance around the cabinet for a field engineer to perform the inspection and alignment procedures. If the unit is being installed as part of a multi-unit configuration, some further repositioning may be required later (see “Cabinet-to-Cabinet Mounting” below).

Leveling

The library needs to be leveled within ± 1 degree of true horizontal.

Note: The front door may be difficult to open until you have lowered the leveling feet to the floor and adjusted them so that the door opens easily.

If plans have been made for installing additional units in this location and this is the first library in the library system, it is important to level the unit so that additional units can be parallel to each other and still be within the foot adjustment capabilities of the cabinets.

To secure the library cabinet and to allow the front door to close properly, be sure that all four feet are resting securely on the floor (located on the underside of the cabinet at the four corners). Tighten each foot against the floor, taking the weight off the casters. If additional leveling is required, continue to raise or lower the individual foot as needed.

Opening the Doors

The door handle has a vertical orientation when the door is latched.

- 1 Unlatch the door by rotating the handle counterclockwise one-half turn. Use the door handle to open the door gently. The front door may not open easily until the cabinet feet have been lowered and the cabinet leveled.

Caution: Do not force the front door open wider than 130 degrees. Doing so will damage the door and cause installation or operational failures.

- 2 Remove the rear access panel by removing the 11 screws that attach the panel to the cabinet.

Note: Remove the top middle screw last, when removing the rear panel, and install it first, when replacing the panel.

Installing the Inport/Outport Device

If the library that you are currently installing is the master library, i.e., Logical Unit Number (LUN) 0, refer to the *ACL2640 IOD Installation Instructions*. After installing the IOD, proceed to “Unpowered Visual Inspections.”

If this unit is not the master library, continue to “Installing the PTM Cutout Covers.”

Installing the PTM Cutout Cover

If the library that you are currently installing is not the master library and will not be part of a multi-library system, perform the following procedure. Otherwise, proceed to “Unpowered Visual Inspections.”

- 1 Remove the PTM Cutout Cover (cover) from the Accessories Kit.
- 2 If applicable, power-down the library and open the front door.
- 3 Orient the cover so that the adjustable bracket is up and the fixed bracket is down.
- 4 Place the cover against the library so that the window’s bottom edge is in between the cover and fixed bracket and then push the cover down so that the fit is snug.
- 5 From the inside of the cabinet, push the adjustable bracket up so that the window’s top edge is in between the cover and adjustable bracket and then tighten the two thumbscrews so that the fit is snug.
- 6 Reverse this procedure to remove a PTM Cutout Cover.

Unpowered Visual Inspections

To conduct an unpowered visual inspection, refer to figure 2 on page 5 and figure 15 on page 41 and do the following:

- 1 Manually move the vertical axis through its full range in both directions.
- 2 Manually rotate the carousel one revolution in each direction by gently pushing the octagon.

Caution: To manually rotate the octagon with bin packs mounted, gently pull on the upper half of the top row of bin packs.

- 3 Manually extend and retract the gripper assembly on the extension axis.
- 4 Verify that everything moves smoothly and that nothing appears broken. If there is a problem that cannot be readily fixed, refer to the *ACL2640 Field Service Manual*.
- 5 Reseat any electrical connections that appear loose or disconnected.
- 6 Check all visible cable connections on the door interconnect board, extension axis assembly, control panel board, and power supplies. The control board and door interconnect board are visible on the inside of the front door.
- 7 Verify that all power cables are plugged into the internal power distribution box, as shown in Figure 15. Power cables should be connected to the logic power supply, motor power supply, and fans.
- 8 Some important electronic connections are hidden by the library electronics assembly cover. (See Figure 20 on page -54.) Remove the cover and verify that the boards and PROMs are seated properly and that all connectors appear securely fastened. Leave the cover off until after the powered visual inspection (described in “Powered Visual Inspections”) is completed.
- 9 The factory setting for the MUC SCSI ID is 2. If the customer requires a different MUC SCSI ID, remove the rear access panel and locate the MUC ID CONFIG switch SW1. See Figure 14 on page -39 and refer to Table 9 and Table 10 on page -40 to set the correct MUC SCSI ID.

Note: When removing the rear access panel, remove the top middle screw last. When installing it, replace the top middle screw first.

Figure 14 MUC SW1

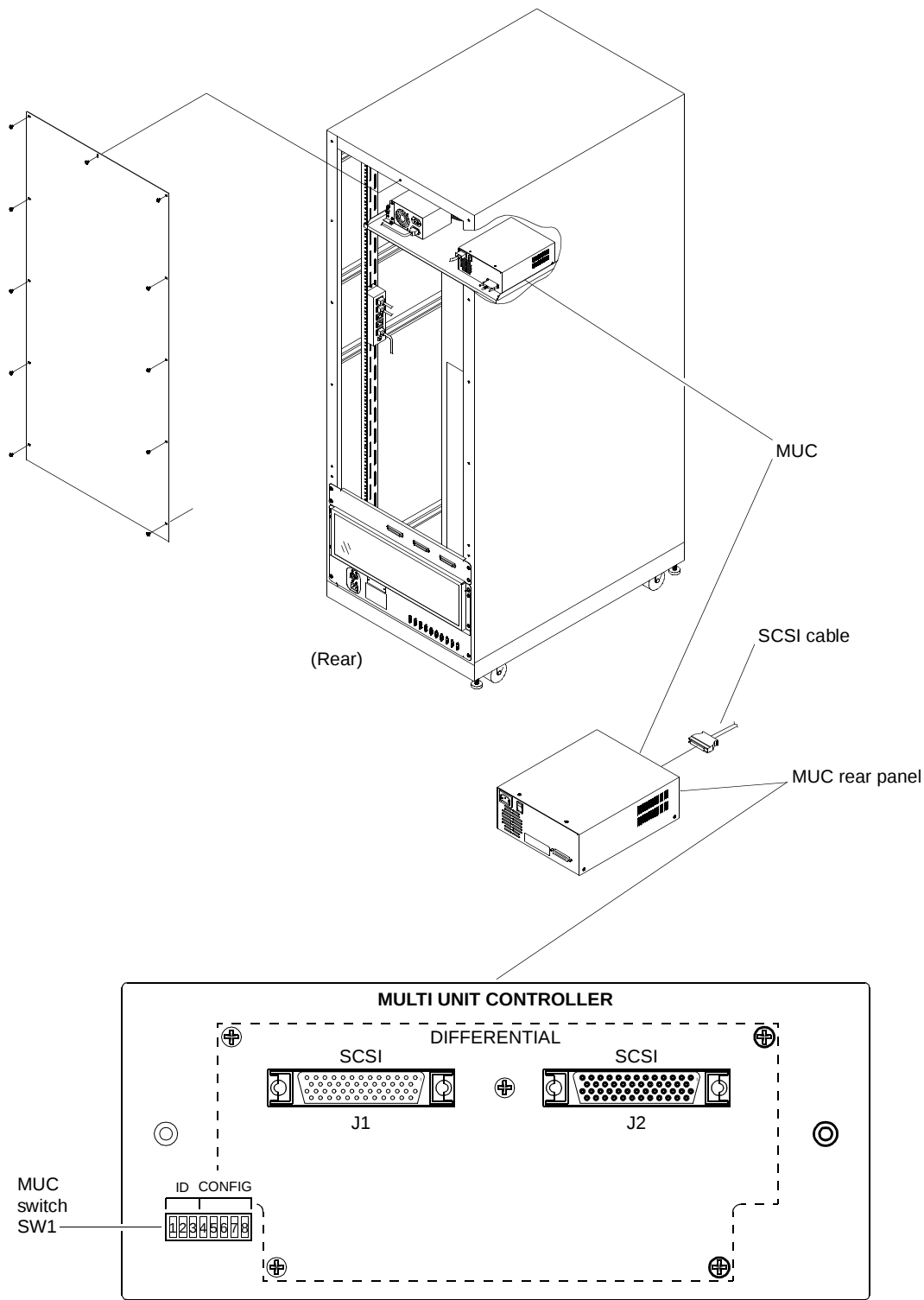


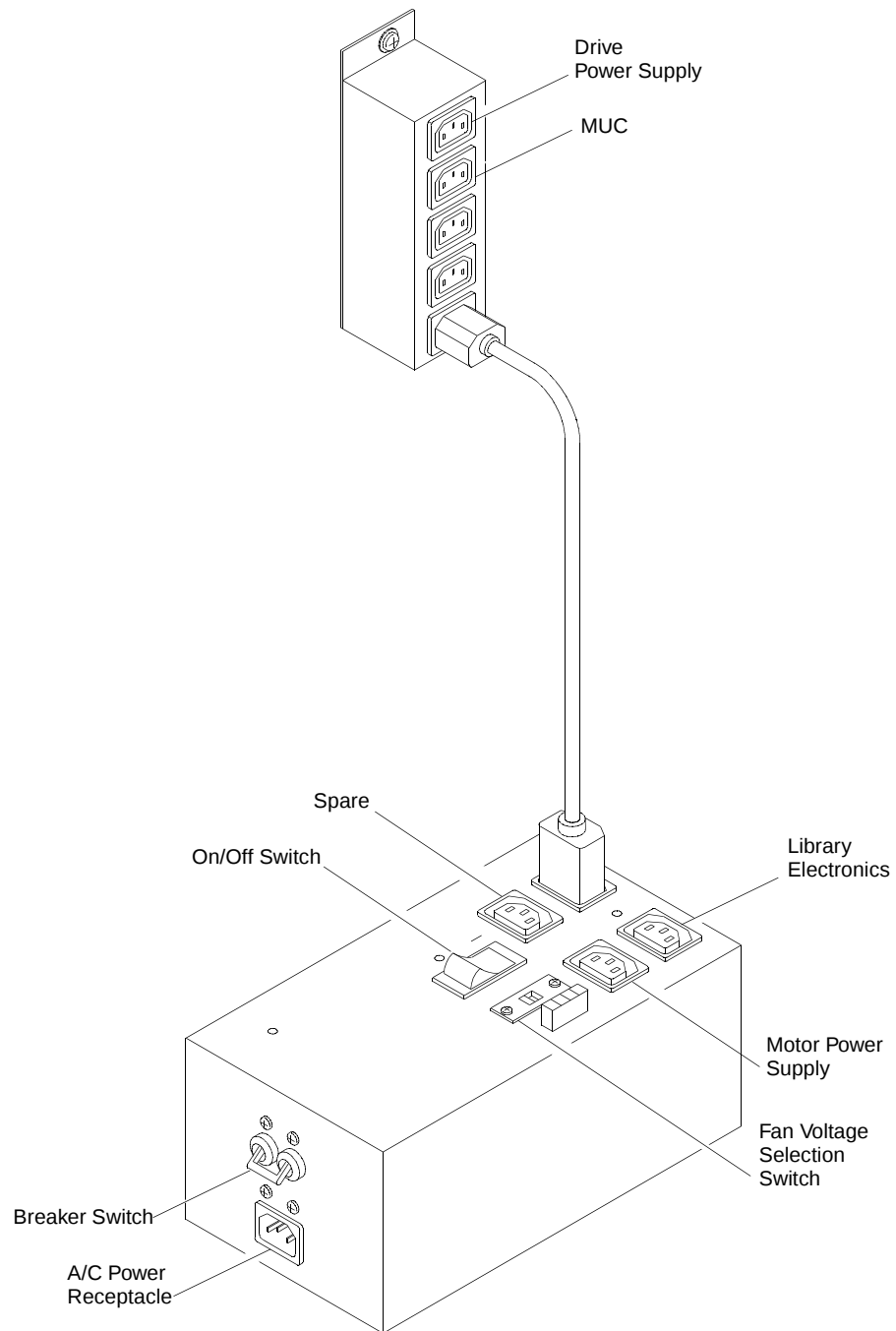
Table 9 MUC SW1
Microswitch Functions

Microswitch	Function
1, 2 & 3	SCSI ID (see Table 10)
4 & 5	Reserved for testing. (Must be in the DOWN position.)
6	Disable Bus Reset on Power-Up (Default=Disabled / UP)
7	Host Selection (DOWN=SCSI / UP=RS-232)
	Note: When this microswitch is UP, Table 10 is not applicable.
8	Reserved for testing. (Must be in the DOWN position.)

Table 10 SCSI IDs

SCSI ID	SW1	SW2	SW3
0	DOWN	DOWN	DOWN
1	UP	DOWN	DOWN
2	DOWN	UP	DOWN
3	UP	UP	DOWN
4	DOWN	DOWN	UP
5	UP	DOWN	UP
6	DOWN	UP	UP
7	UP	UP	UP

Figure 15 Internal Power
Distribution Box



Adjusting Belt Tension

Belt tension must be checked and adjusted prior to applying power to the library.

Warning: Overtensioning the belts can result in damage to the belt and other drive components. Undertensioning can result in degraded performance and system failure.

Vertical Axis Belt

To test the vertical axis belt tension, see Figure 16 and do the following:

- 1 Remove power from the library by turning off the circuit breaker switch, located on the lower left corner of the rear connector panel.
- 2 Open the front door of the library.
- 3 Move the counterweight to the top of the door; this will position the vertical carriage at the base of the door.
- 4 Using a force gauge press on one side of the belt midway up the door.
- 5 Measure the force required to push the belt together so that the two sides just touch with the belt teeth interleaved.
- 6 The force should be between 18 and 22 ounces (510-623 g). If the belt tension is outside of this range, an adjustment is needed.

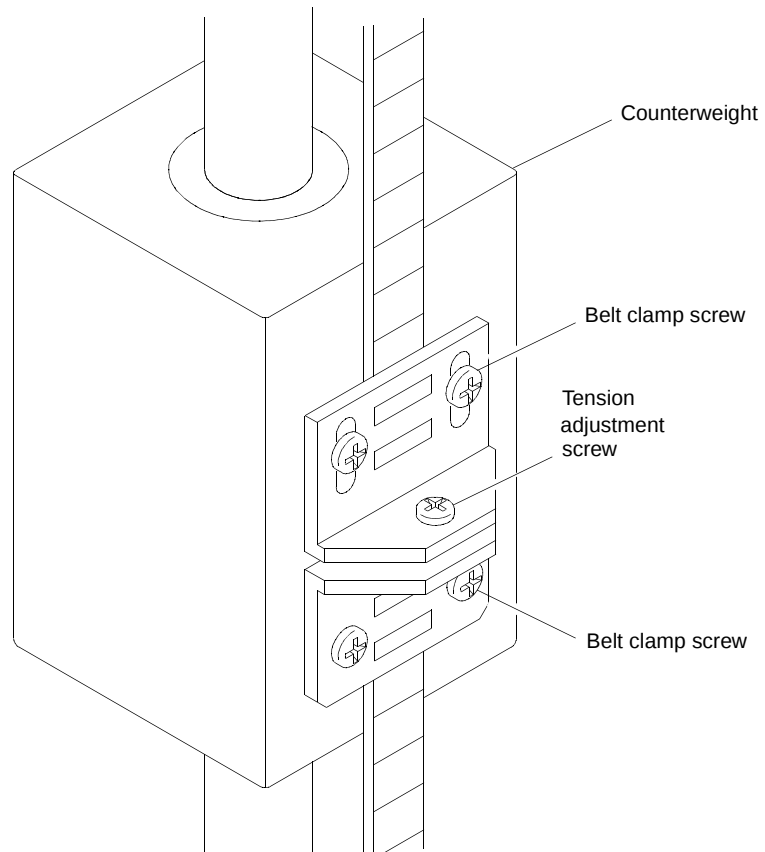
To adjust the vertical axis belt tension, see Figure 16 and do the following:

- 1 Move the counterweight to approximately eye-level.
- 2 Loosen by one-half turn the two top belt clamp screws holding the top side of the vertical belt to the counterweight.
- 3 Turn the tension adjustment screw clockwise to tighten the belt tension and counterclockwise to loosen the belt tension.

Note: The adjustment screw will not normally need to be turned more than two revolutions.

- 4 Move the counterweight back to the top of the door and recheck the belt tension.
- 5 When 18 to 22 ounces (510-623 g) of tension on the belt is achieved tighten the belt clamp screws to 30 in-lb. (3.39 N-m)

Figure 16 Vertical Axis
Belt Tensioning



Extension Axis Belt

To test the extension axis belt tension, see Figure 17 and do the following:

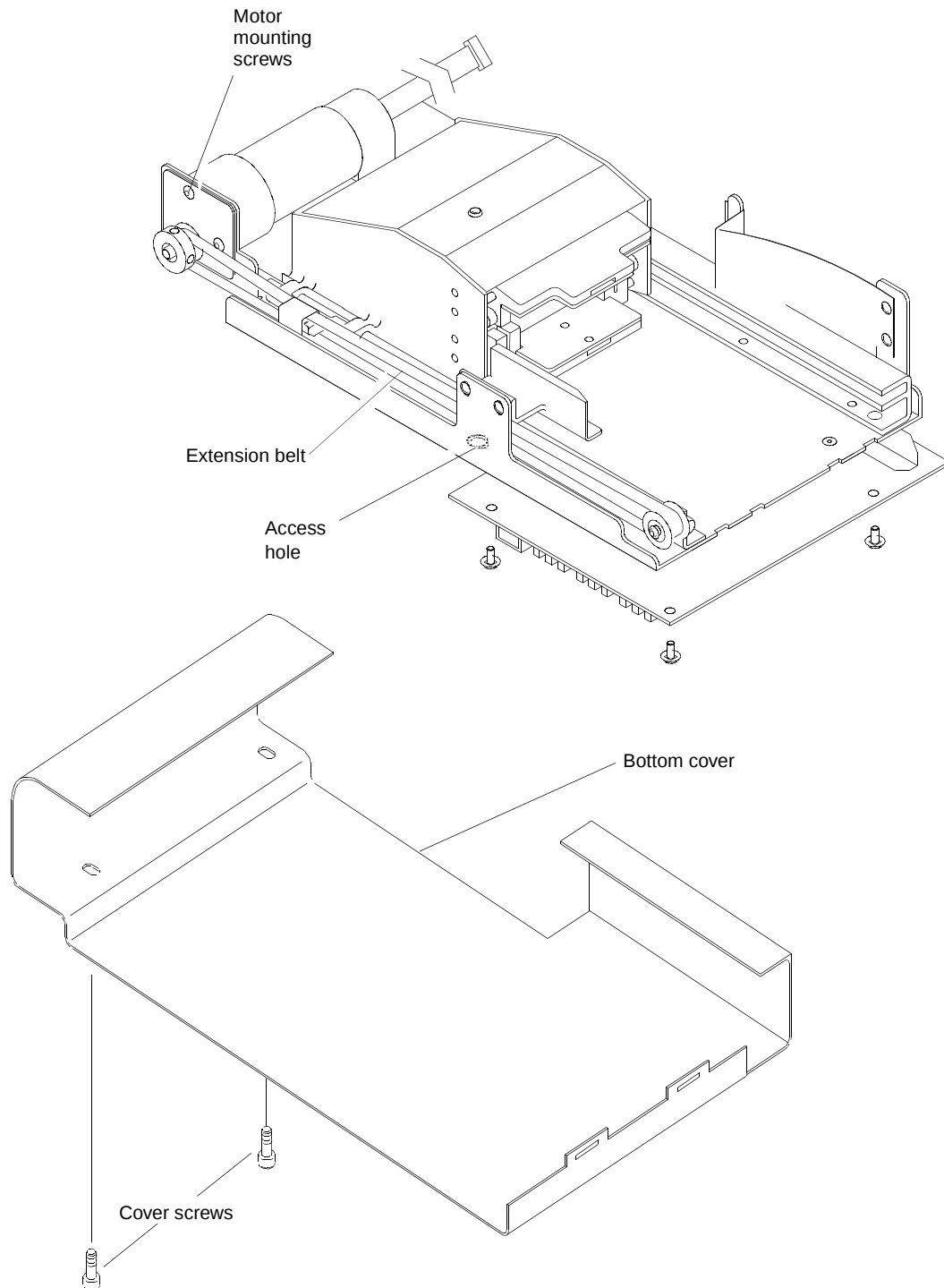
- 1 Remove power from the library by turning off the circuit breaker switch located on the lower left corner of the rear connector panel.
- 2 Open the front door of the library.
- 3 Remove the two screws securing the bottom cover to the extension axis assembly.
- 4 With the screws removed, move the cover forward and then to the right approximately 1" (2.5 cm). Tilt the front of the cover down to the door window and then push it up between the extension axis motor and the door window.
- 5 Move the gripper to the middle of the extension travel, which will position the extension belt clamp directly over the access hole in the baseplate.
- 6 Insert a force gauge through the access hole and press up on the back of the bottom segment of the belt. Record the force reading with the belt just touching the bottom of the belt clamp.

- 7 The force should be between 2.7 and 3.7 ounces (76.6 - 105.0 g). If the belt tension is outside this range, an adjustment is needed.

To adjust the extension axis belt tension, see Figure 17 and do the following:

- 1 Loosen the three extension motor mounting screws one revolution.
- 2 Grasp the motor by looping one finger over the sheet metal of the baseplate and applying a light, steady force to tighten the belt. Snug the motor mounting screws while holding the motor.
- 3 Recheck belt tension and readjust if necessary.
- 4 When belt tension is correct, retighten the mounting screws to 6 in-lb. (.67 N-m) and recheck the tension.
- 5 Reinstall the extension axis cover and tighten the cover screws to 12 in-lb (1.36 N-m).

Figure 17 Extension Axis
Belt Tensioning



Carousel Belt

To test the carousel belt tension, see Figure 18 and do the following:

- 1 Remove power from the library by turning off the circuit breaker switch located on the lower left corner of the rear connector panel.
- 2 Remove the rear access panel from the library.

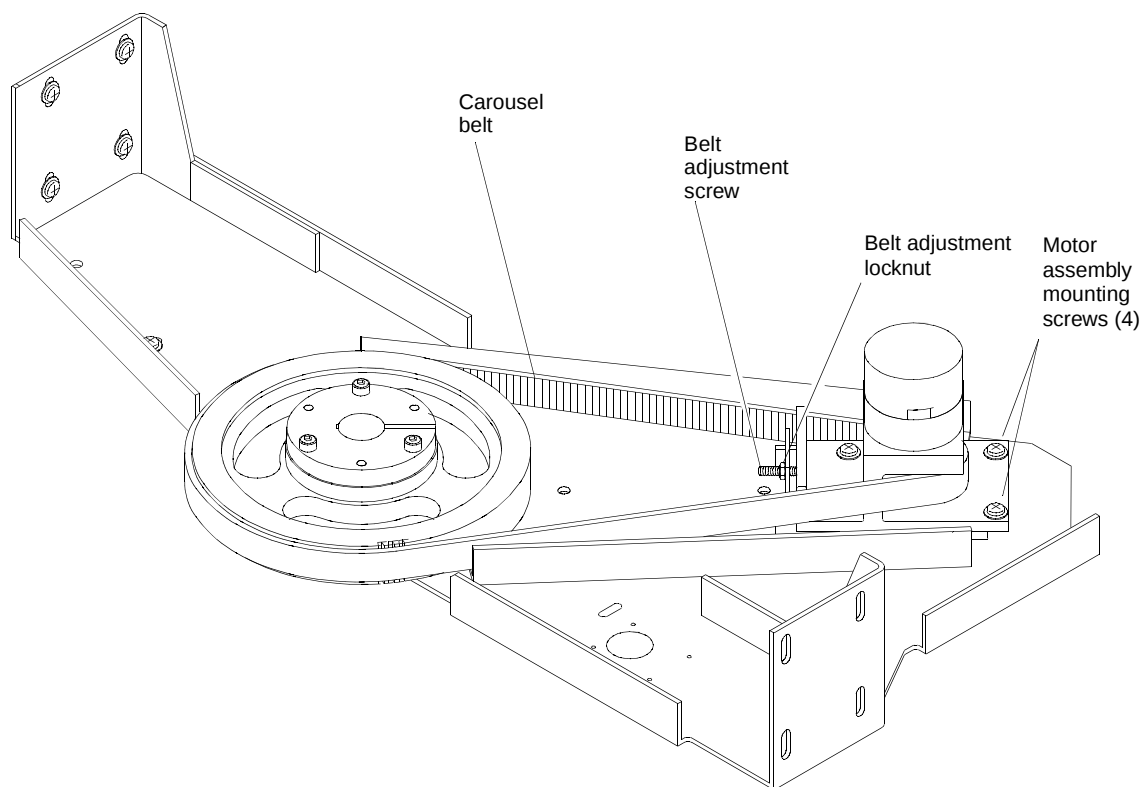
Note: When removing the rear access panel remove the top center screw last, and install it first when replacing the panel.

- 3 Loosen the motor assembly mounting screws one revolution.
- 4 Loosen the carousel belt adjustment locknut.
- 5 Adjust the carousel belt adjustment screw so that a force of 26.60 $\pm$ 2.0 ounces (754 $\pm$ 56 g) applied at the center ($\pm$ 0.25 inches or 6.25 mm) of the belt span will deflect the belt 0.20 inches (5.08 mm).
- 6 Retighten the locknut to approximately 15 $\pm$ 5 in-lb (1.7 $\pm$.56 N-m).

Note: When tightening the locknut, be sure to maintain the belt adjustment screw position.

- 7 Retighten the motor assembly mounting screws to 35 $\pm$ 3 in-lb (3.95 $\pm$.33 N-m).

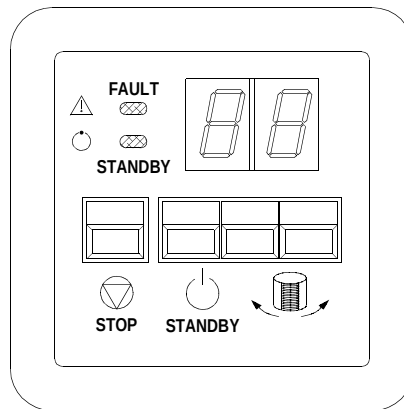
Figure 18 Carousel Belt
Adjustment



Powered Visual Inspection

The library control panel shown in Figure 19 is located on the front door of the library. Make sure the STOP and STANDBY buttons on the control panel are pressed in preparation for applying power to the library.

Figure 19 Control panel



- 1 Open the front door to activate the door safety switches, which provides further protection from unexpected power-up behavior.
- 2 Remove the rear access panel from the library.

Note: When removing the rear access panel remove the top center screw last, and install it first when replacing the panel.

- 3 On the power distribution box, push the circuit breaker switch to the down position, the ON / OFF switch to O (off) and the fan voltage selection switch to the proper position (see Figure 15 on page -41).

Caution: Be sure that the fan 120 / 220 voltage selection switch is in the correct position.

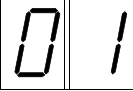
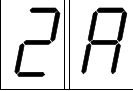
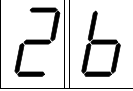
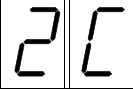
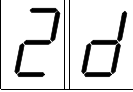
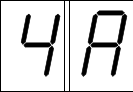
- 4 Connect the power cable to the AC power receptacle and to facility power. Push the circuit breaker switch to the up position (see Figure 15 on page -41).

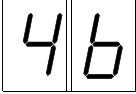
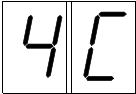
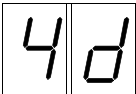
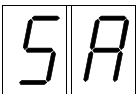
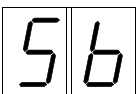
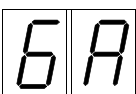
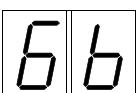
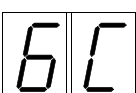
Note: At this point, power is being supplied to the power distribution box and will be distributed to the rest of the library.

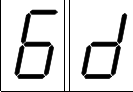
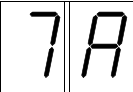
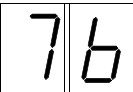
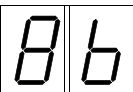
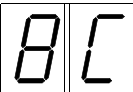
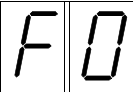
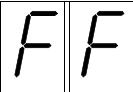
- 5 Set the power distribution box ON / OFF switch to “1” (on), and perform the following tests:
 - a With the STOP and STANDBY buttons pressed, the front door closed, and rear panel installed, the control panel status display should read “2A” and the FAULT and STANDBY indicators should be lit.
 - b With the STOP and STANDBY buttons released, the rear panel installed, and the front door open, the control panel status display should read “2b” and the FAULT indicator should be lit.
 - c With the STOP and STANDBY buttons released, the front door closed, and the rear panel removed, the control panel status display should read “2b” and the FAULT indicator should be lit.
 - d With the STANDBY button pressed, the STOP button released, and the front door closed, and rear panel installed, the control panel status display should read “01” and the FAULT indicator should be off.

If the control panel status display does not operate as indicated above, see Table 11 for a list of the possible display codes and refer to the *ACL2640 Field Service Manual*.

Table 11 Front Control
Panel Status Codes

Code	Code Description	Action to Resolve
	System is on-line and ready to accept host commands.	No action is needed.
	System is off-line and ready to accept diagnostic commands.	Release the STANDBY button by pressing it once. This places the library on-line.
	STOP button is pressed.	Release the STOP button by pressing it once.
	Either the front door is open or the rear panel is removed	Check the front door and rear panel.
	System is performing a power-up sequence.	This code should only be displayed for 5-10 seconds during the power-up sequence. If it continues to display, call for field service.
	System is initializing actuators and taking inventory.	If this code persists and the robotic equipment inside the library unit does not move, call for field service.
	Inventory failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, ask the system administrator to refer to the error codes from the library to the host, which will indicate the cause of the failure.
	Extension home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.

Code	Code Description	Action to Resolve
	Extension test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carriage A / D failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carriage diagnostic test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Vertical home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Vertical test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel A / D test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.

Code	Code Description	Action to Resolve
	Carousel digital test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Gripper home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Gripper test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Light curtain test failed.	1) Press the STANDBY button to put the library off-line and open the front door. 2) Remove / replace any objects that may be in the way of the light beam, such as a tape partially ejected from a tape drive or a cartridge not properly seated in a bin pack. Close the front door. 3) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Light curtain broken.	1) Press the STANDBY button to put the library off-line and open the front door. 2) Remove / replace any objects that may be in the way of the light beam, such as a tape partially ejected from a tape drive or a cartridge not properly seated in a bin pack. Close the front door. 3) Release the STANDBY button to put the library back on-line. 4) If the code still persists, call for field service.
	Carousel is on face indicated (0-7).	These codes are only displayed for a few seconds when you press the ← and → to move the carousel. No action is needed.
	Missing or defective MPU firm ware.	Call for field service.

**Robotic Controller
LEDs**

The robotic controller has twenty-eight status LEDs that can be used to help troubleshoot the library if any problem exists during library testing. Figure 20 shows the location of the LEDs and Table 12 on page -54 describes the function of each LED.

The extension axis assembly has nine status LEDs. Figure 21 and Table 13 on page -56 shows the location and describes the function of each extension axis LED.

Figure 20 Robotic
Controller LEDs

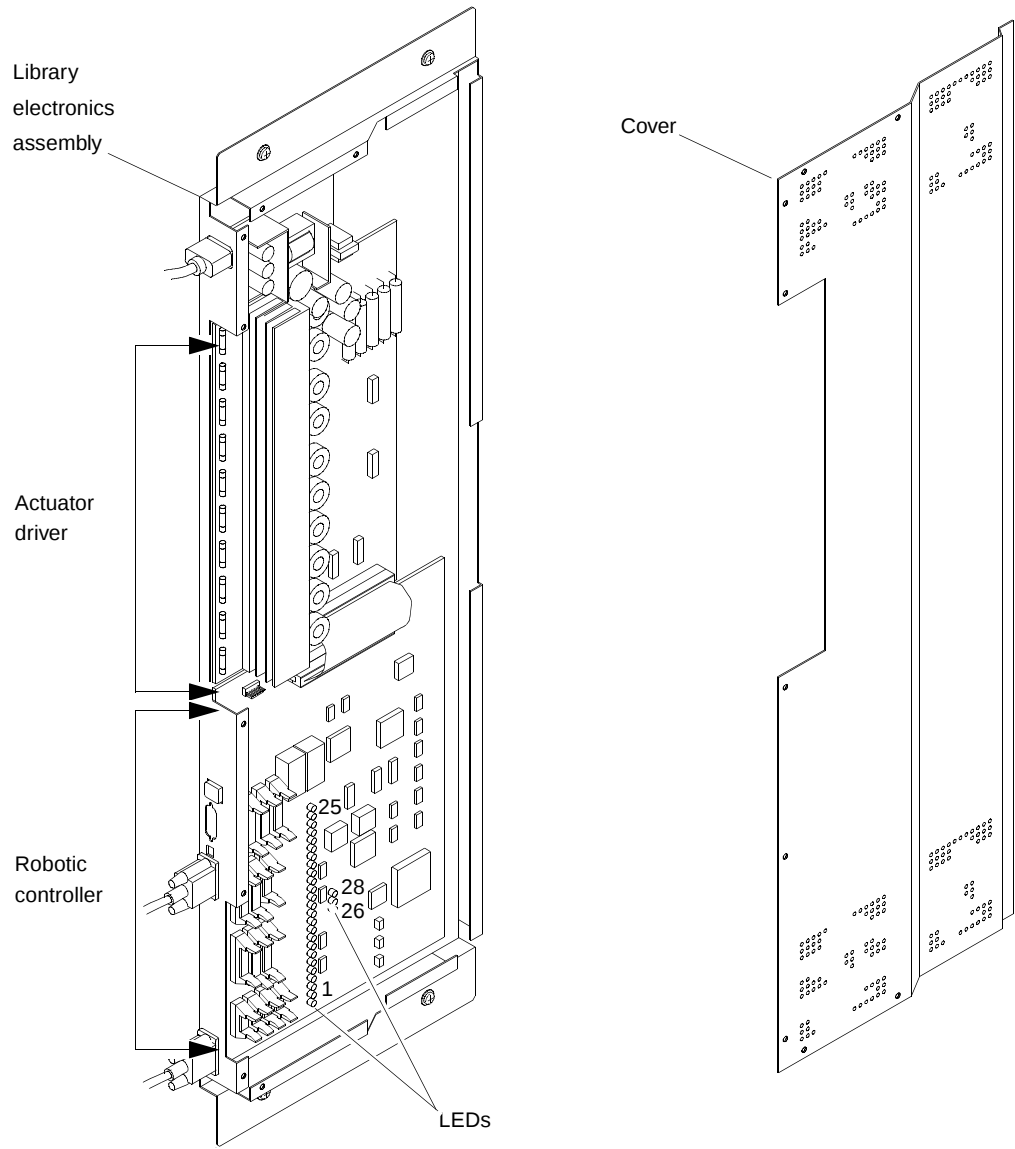


Table 12 Robotic
Controller LEDs

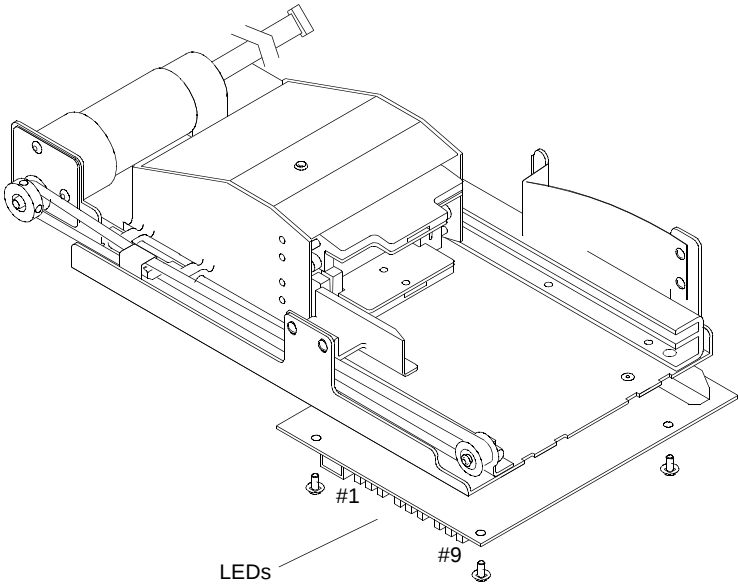
LED	Color	Description	Function
1 (bottom)	yellow	vert home	The vertical carriage is at the HOME position.
2	yellow	vert limit	The vertical carriage is at the LIMIT position.
3	yellow	left tray	A cartridge is present on the PTM at the left tray position
4	yellow	left gate	A cartridge is present on the PTM at the left gate position
5	yellow	right gate	A cartridge is present on the PTM at the right gate position

LED	Color	Description	Function
6	yellow	right tray	A cartridge is present on the PTM at the right tray position
7	yellow	lift gate down	PTM lift gate is down.
8	yellow	lift gate up	PTM lift gate is up.
9	yellow	inport open	The IOD inport door is open.
10	yellow	inport present	A cartridge is present in the inport.
11	yellow	outport open	The IOD outport door is open.
12	yellow	inport registered	A cartridge is properly registered in the inport.
13	yellow	outport full	The IOD outport is full.
14	yellow	carousel home	The carousel is at the HOME position
15	yellow	carousel face	The carousel is positioned on a FACE
16	red	door open	The front door or rear panel is open.
17	yellow	diag receive	The RS-232 diagnostic port is receiving
18	green	controller transmit	The RS-232 controller port is transmitting
19	green	diag transmit	The RS-232 diagnostic port is transmitting
20	yellow	controller receive	The RS-232 controller port is receiving
21	green	bar code transmit	The RS-232 bar code port is transmitting.
22	yellow	bar code receive	The RS-232 bar code port is receiving.
23	yellow	actuator driver fault	A FAULT condition exists on the actuator driver board.
24	yellow	standby	The system is in STANDBY mode.
25 (top)	red	system stopped	The front panel STOP button is pressed.
26 (bottom)	red	fault	The front door or rear panel is open, STOP button is pressed, or some other FAULT condition exists.
27	red	MPU error	The microprocessor has a bus error.
28 (top)	green	+5V	+5VDC is present on the robotic controller.

Table 13 Extension Axis
LEDs

LED	Color	Description	Function
1	green	+5V	+5VDC present on the extension axis.
2	green	ext home	The extension axis is at the HOME position.
3	green	hall effect 0	Geneva hall effect sensor 0 is active.
4	green	rear CIG	The rear cartridge-in-gripper sensor indicates a cartridge is present.
5	green	front CIG	The front cartridge-in-gripper sensor indicates a cartridge is present.
6	red	motor err 2	An error in the gripper motor circuitry has occurred.
7	green	hall effect 1	Geneva hall effect sensor 1 is active.
8	green	ext limit	The extension axis is at the LIMIT position.
9	red	mot err #1	An error in the extension motor circuitry has occurred.

Figure 21 Extension Axis
LEDs



Horizontal Alignment and Vertical Calibration

The gripper and all tape drives must be horizontally aligned. Additionally, the vertical location (calibration) of each bin slot, tape drive and the Passthrough Mechanism (PTM) must be identified prior to any diagnostic testing.

Testing the Library

For the following procedures refer to the *ACL2640 Diagnostic Software User's Manual* and see Figure 22.

- 1 With library power applied, press and release the control panel STOP switch and then the STANDBY switch.
- 2 Verify that the control panel status display shows "01" (standby).
- 3 Connect the diagnostic PC cable to the rear connector panel as shown in Figure 22.
- 4 Open the front door of the library and place test cartridges in one or more bins of each face.

Note: The customer's System Administrator must be present for the next step.

The ACL2640 is designated as model 6200206 or 6200216.

- 5 Use the "Config" menu of the diagnostic software to configure the library.

Caution: Verify that the actuator paths are clear of obstructions.

- 6 Using the diagnostic software, run a self-test on the system. (This provides a limited check on the operation of the system without moving any of the axes significantly. If the unit does not pass this self-test or any of the following tests, refer to the *ACL2640 Field Service Manual*.
- 7 After successfully completing a self-test, home all actuators.

Note: Observe all "place" procedures carefully to verify that cartridges are inserted properly.

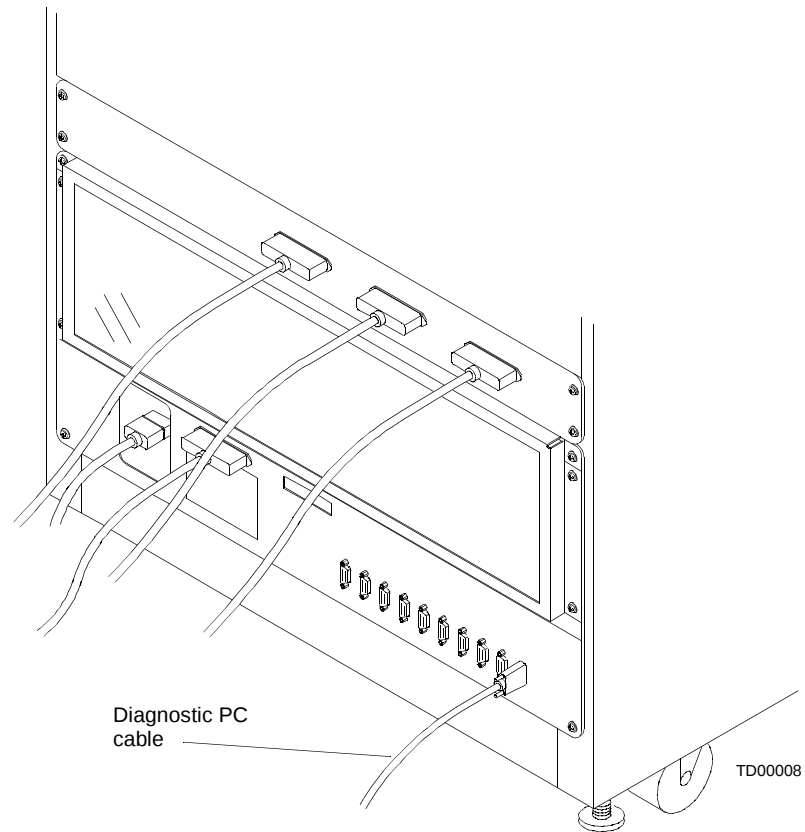
- 8 Use the diagnostic software to pick a cartridge and then place it in the bin slot of a different face. (Repeat this step for every face of the carousel.)

- 9 Use the diagnostic software to place a cartridge into each tape drive.
- 10 On the control panel, press and release the STOP switch.
- 11 Open the front door of the library.
- 12 Press and release the tape DRIVE UNLOAD switches, manually remove the test cartridges from each tape drive and then return them to empty bin slots.
- 13 Close and latch the door.
- 14 On the control panel, press and release the STOP switch.
- 15 Use the diagnostic software to verify the operation of the PTM by placing and picking a cartridge to it. (Repeat this step several times.)
- 16 If applicable, use the diagnostic software to verify the operation of the IOD by importing and exporting a cartridge from / to it. (Repeat this step several times.)
- 17 After successfully completing these tests:
 - Press and release the control panel STOP switch.
 - Open the library door and remove all test cartridges, then close and latch the door.
 - Press and release the control panel STOP switch.

Note: If this is a stand-alone library, proceed to “Loading the Library.”

If this library is part of a multi-unit configuration, proceed to “Cabinet-to-Cabinet Mounting.”

Figure 22 Diagnostic PC
Cable Connection



Cabinet-to-Cabinet Mounting

If you have multiple units attached to each other, you must cable each of them to the MUC. The required cabling is in the Cabinet-to-Cabinet Attachment Kit (P / N 6205016) and is purchased separately.

To prepare the library for mounting, disconnect the diagnostic PC and power down the library as follows:

- 1 Press the STOP button on the control panel. The FAULT light will illuminate and “2A” will be displayed.
- 2 Remove power from the library by turning off the circuit breaker switch, which is located on the lower left corner of the rear connector panel.
- 3 Disconnect the diagnostic PC serial cable from the rear of the library.
- 4 Remove the cover plates on the side of each unit for each side that is to be mated with another cabinet.

Multiple units may be attached in any order. The units will be addressed left to right (when viewed from in front of the units) with logical unit 0 being on the left. Cabling from the distribution panel must reflect this order, see “External Library Cabling” for cabling instructions.

Refer to the *ACL2640 Cabinet-to-Cabinet Mounting Instructions* for instructions on how to mount the cabinets for a multi-unit configuration.

Aligning PTMs from Library to Library

The PTM is mounted to the cabinet retma rails with mounting brackets that provide adjustment in three directions (up / down, forward / back, and left / right). When configuring two or more units side by side in a multi-unit configuration, it is important that the PTM for each unit be properly aligned with the PTM for the adjacent unit(s) so that cartridges can move between units.

After each unit has been leveled and the cabinet-to-cabinet mounting brackets (front and rear) have been installed, use the up / down and front / back adjustments in the PTM mounting brackets by loosening the respective two screws for each adjustment and moving the PTM so that it aligns with the PTM in the adjacent cabinet.

Note: The left / right adjustment (which is critical to proper gripper-to-PTM operation) is made at time of installation of the PTM and should not be disturbed.

The cabinet-to-cabinet PTM alignment can be observed and adjusted by inserting a cartridge on the conveyor and gently pushing it from one PTM across to a PTM in an adjacent cabinet. Adjust each adjacent PTM up / down and forward / back so that cartridges will move freely from one PTM to the next.

Refer to the *ACL2640 Cabinet-to-Cabinet Mounting Instructions* for instructions on how to mount the cabinets for a multi-unit configuration.

Loading the Library

The library is capable of supporting DLT 2000, DLT 4000, or DLT 7000 tape drives. The library is also capable of supporting DLTtape III and DLTtape IV cartridges, which are dark gray and black, respectively. When loading the library with cartridges, observe the compatibility of cartridges and tape drives as defined in Table 14.

Table 14 Cartridge/Tape Drive Compatibility

Cartridge Type	DLT 2000 Tape Drive	DLT 4000 Tape Drive	DLT 7000 Tape Drive
DLTtape III	compatible	compatible	compatible
DLTtape IIIXT	not compatible	not compatible	not compatible
DLTtape IV	not compatible	compatible	compatible

Caution: ***DO NOT USE** DLTtape I, DLTtape II **or** DLTtape IIIXT cartridges in this library.*

Bar code labels are supplied in the library accessories kit for labeling your DLT tape cartridges. To speed the library inventory process, install the bar code labels on all tape cartridges before placing the cartridges in the library. With a completely full carousel, the inventory process takes approximately four minutes if bar code labels are installed on all tape cartridges and over fifty minutes if bar code labels are not installed.

Note: Bar code labels will speed the inventory process even if the bar code information is not used by the application software driving the library.

Caution: Examine all cartridges before loading them into the library or tape drives. Look for label stock or other foreign material that may be clinging to them.

Note: Your facility may have its own requirements regarding the order of cartridges in bin packs. Refer to these requirements when loading cartridges.

Figure 23 on page -64 shows how to insert a bin pack into the carousel. To load a cartridge into a bin pack that is already mounted on the carousel, do the following.

- 1 Place the library off-line, by pressing the STANDBY button. The STANDBY indicator lights and "01" displays.
- 2 Rotate the carousel by pressing the right and left arrow buttons until the desired carousel face is at the front.
- 3 Open the front door.
- 4 Insert tape cartridges into the bin pack with the bar code label slot facing out and the cartridge spindle facing down.

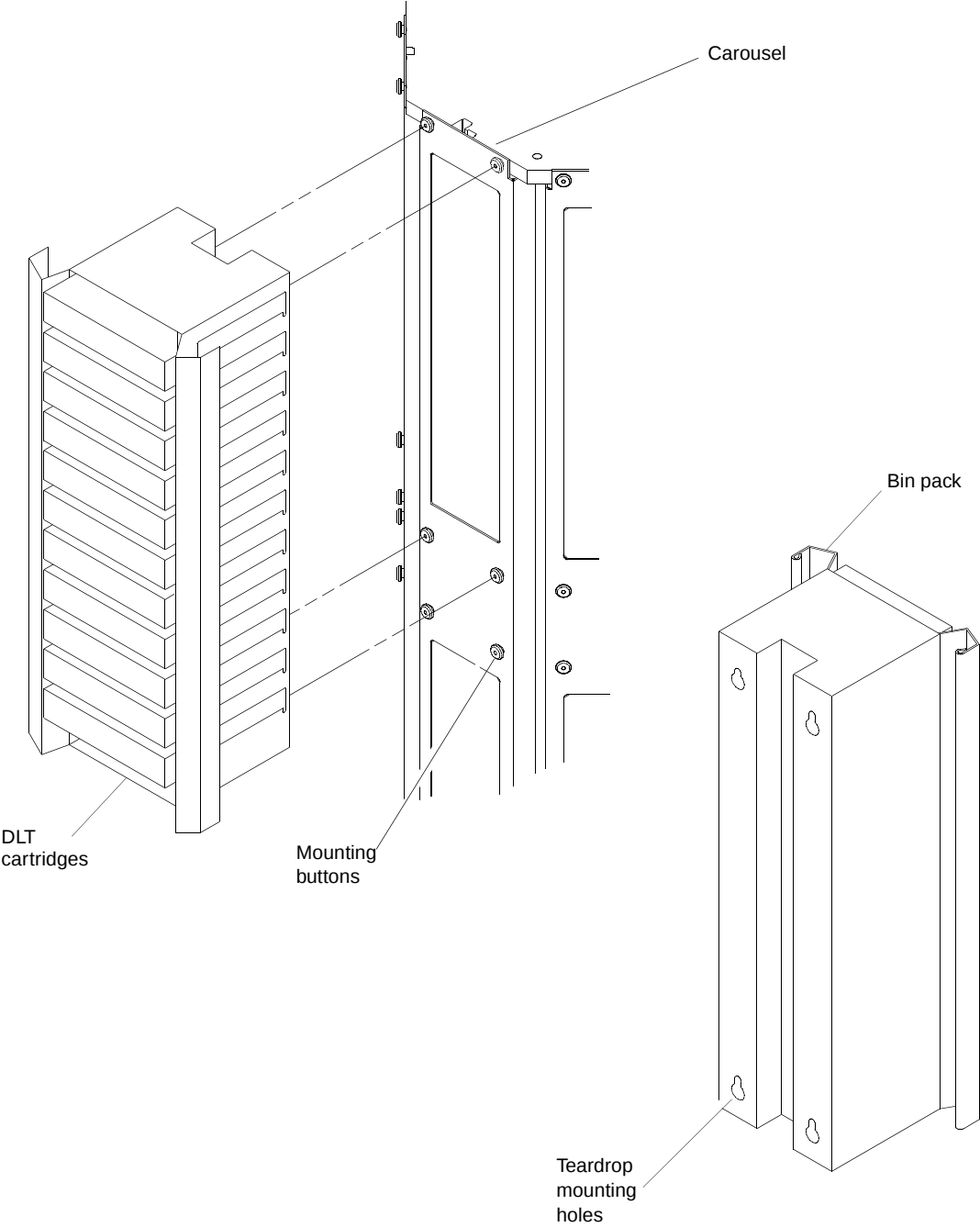
Note: Since a cartridge cannot be fully inserted into a bin pack incorrectly, you will notice if the cartridge does not fit into the cartridge slot completely.

- 5 Run your hand down the front face of the cartridges on the exposed carousel face to make sure they are seated properly. (Do not run your hand up the front face of the cartridges since this can cause them to become seated incorrectly.)
- 6 Close the front door.
- 7 Verify that the STOP button is released.
- 8 Place the library on-line by releasing the STANDBY button.

Once the front door is closed and the library is on-line, it will reinventory the following:

- The front face of the carousel.
- Any other faces that were exposed while the door was open.
- The tape drives.
- The PTM if a cartridge is detected on the tray.

Figure 23 Loading the Library



Tape Drive Cabling

Internal Power Cabling

The single power distribution box within the library has two sets of outlets (see Figure 15 on page -41). One set is dedicated to the unit's internal robotics, while the other is available for the tape drives and MUC.

For tape drive power cables, use only the outlets in the section of the power distribution box for tape drives and system integrator electronics. The receptacles accept IEC-320 style plugs and are rated at 10A each.

A circuit breaker on the outside of the power distribution box is provided for safety. The library electronics bank uses a 10A breaker.

Caution: Make sure the switch on the power supply connected to the tape drives is OFF while you hook up the tape drive cabling.

Internal Library SCSI Cabling

The tape drive systems inside the library need to be connected to a SCSI bus. The procedure for connecting the SCSI cable to the SCSI bus will depend upon whether a MUC is installed and whether the library has multiple units.

The tape drives and the MUC can be configured according to your needs by using the cables and terminators provided. For instance, the library can be connected on a single SCSI bus (daisy-chained), on separate SCSI buses to any/all tape drives and the MUC or any combination of the two. For configuration examples, and cable part numbers see Figures 24-27 for libraries with DLT™2000 or DLT™4000 tape drives installed, and Figures 26-28 for libraries with DLT™7000 tape drives installed.

Figure 24 DLT 2000/DLT
4000 4-Bus (as-shipped)
Configuration

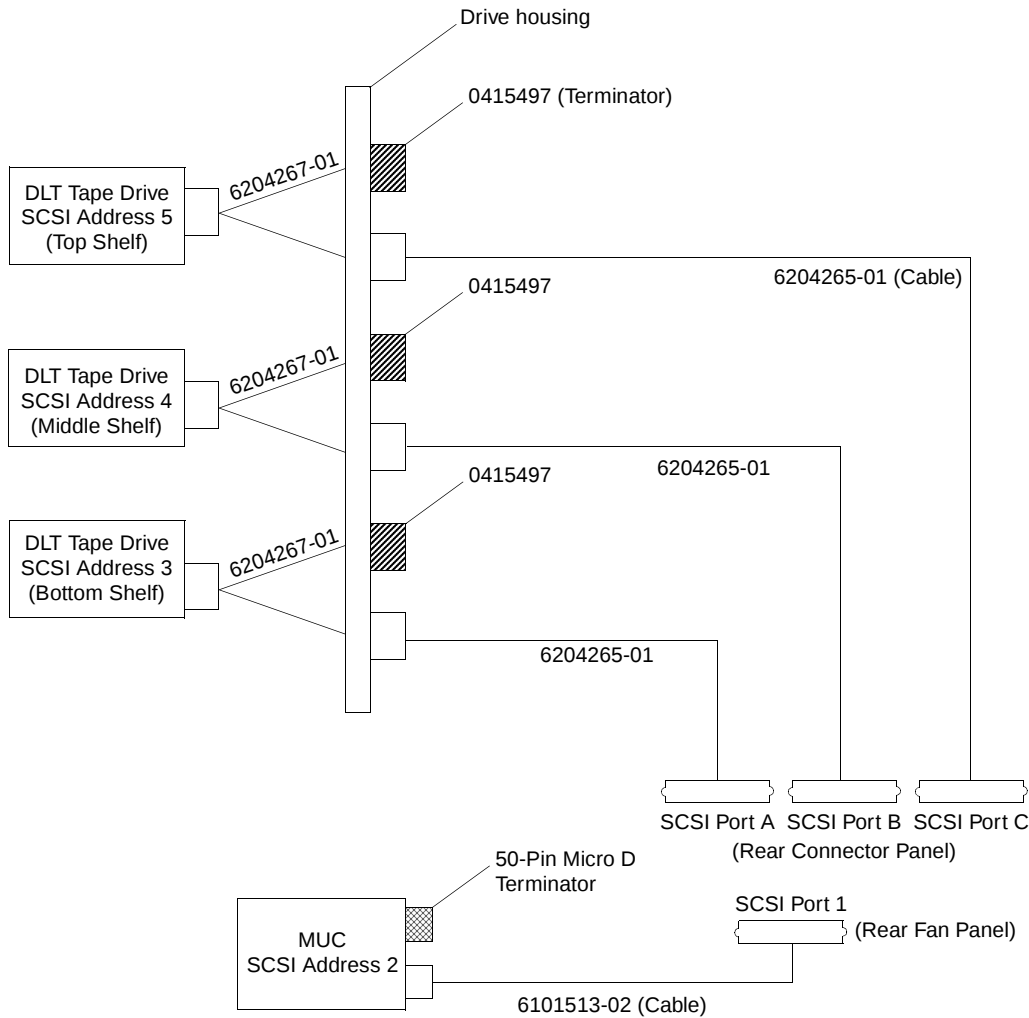
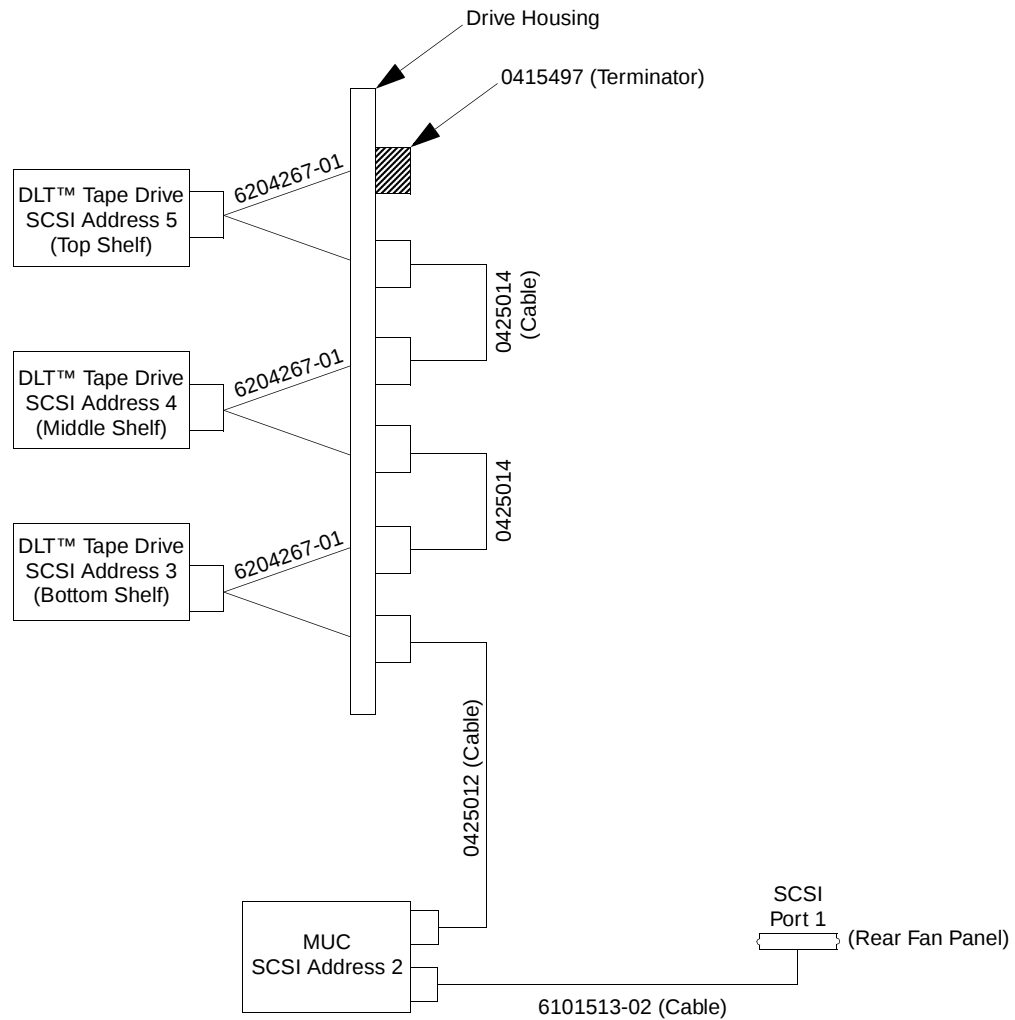
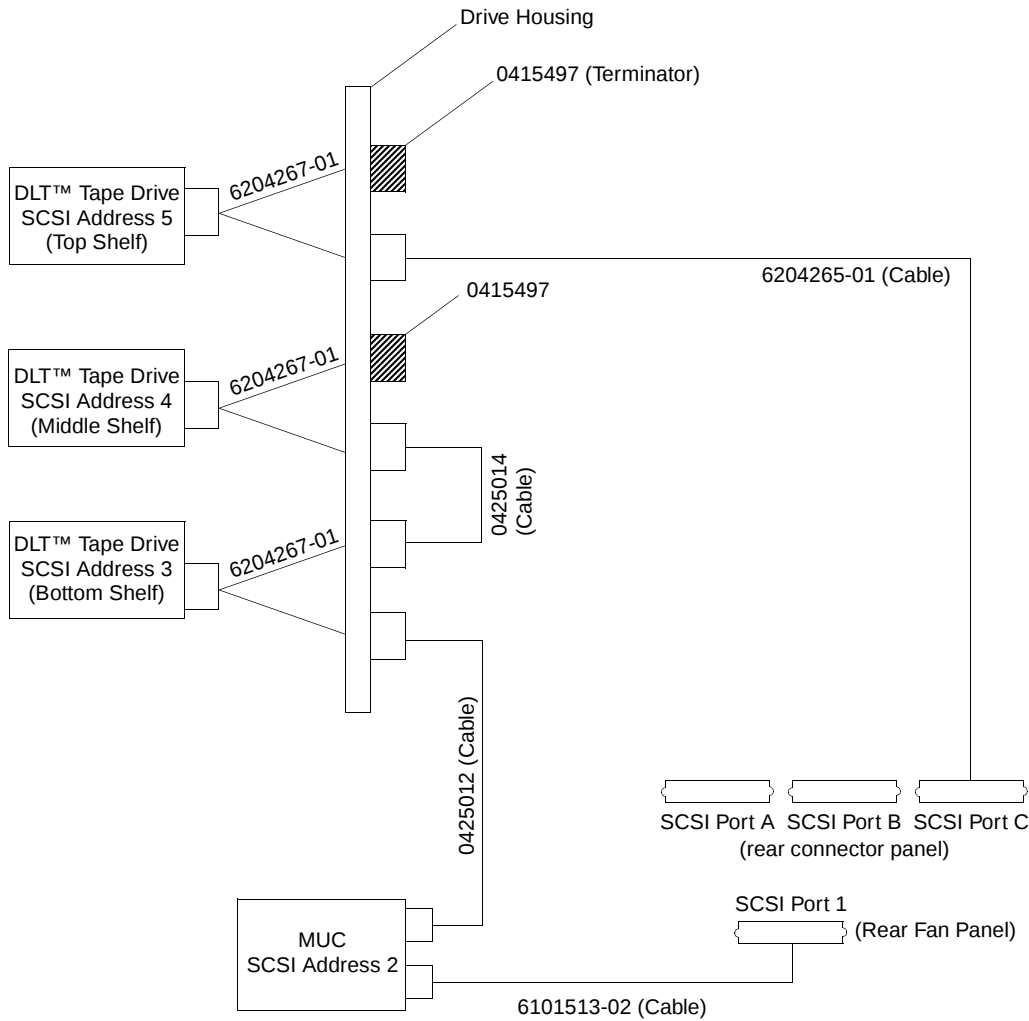


Figure 25 DLT 2000/DLT
4000 1-Bus Configuration
(Sample)



TD30005

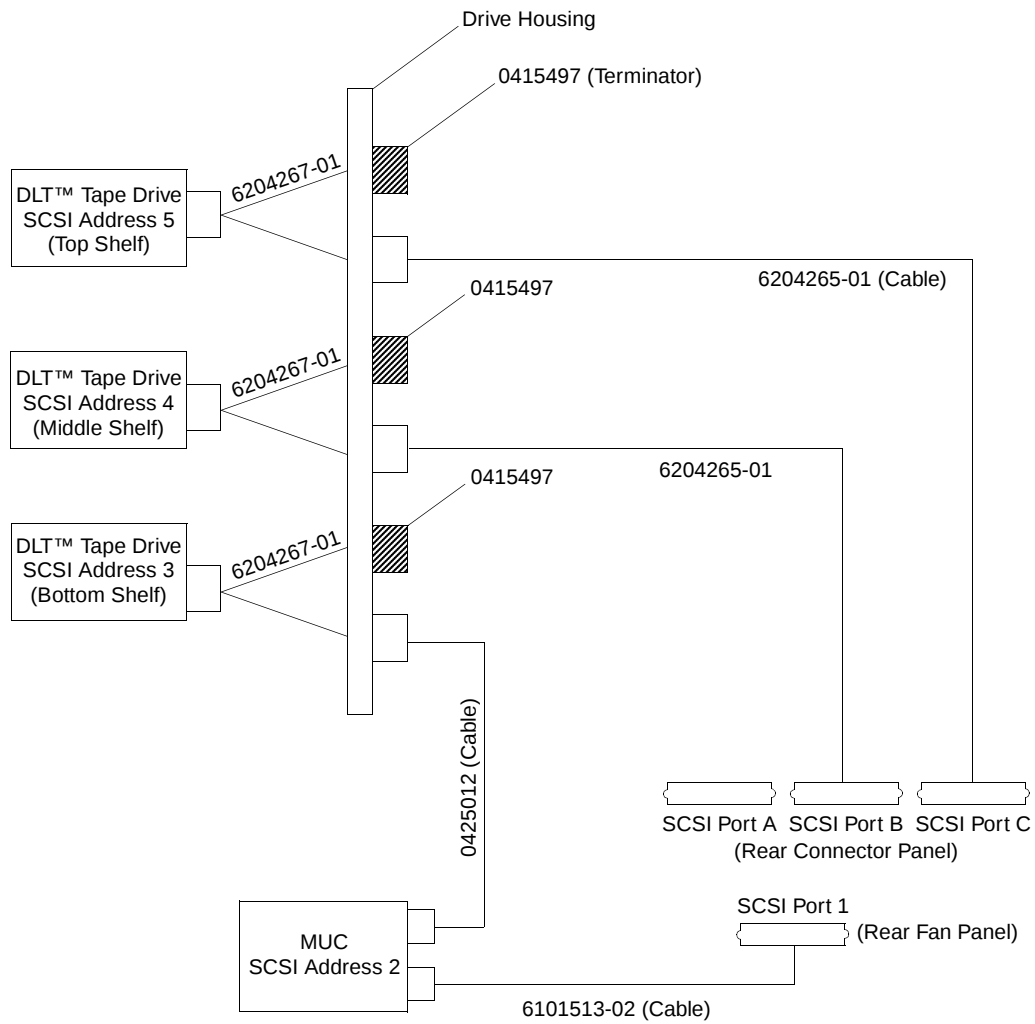
Figure 26 DLT™2000/DLT™
4000 2-Bus Configuration
(Sample)



TD30006

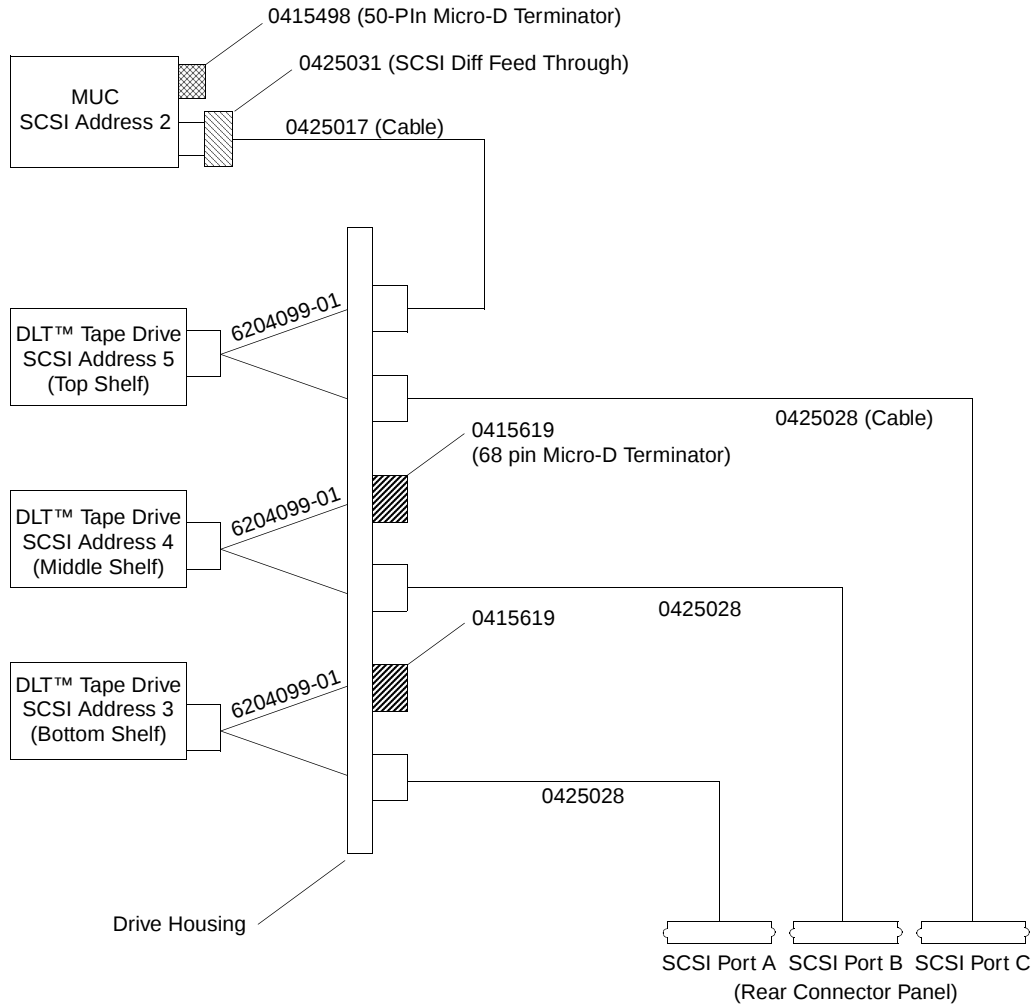
Figure 27 DLT 2000/DLT
4000 3-Bus Configuration

(Sample)



TD30007

Figure 28 DLT 7000 3-Bus (as-shipped) Configuration



TD30004

Figure 29 DLT 7000 1-Bus
Configuration (Sample)

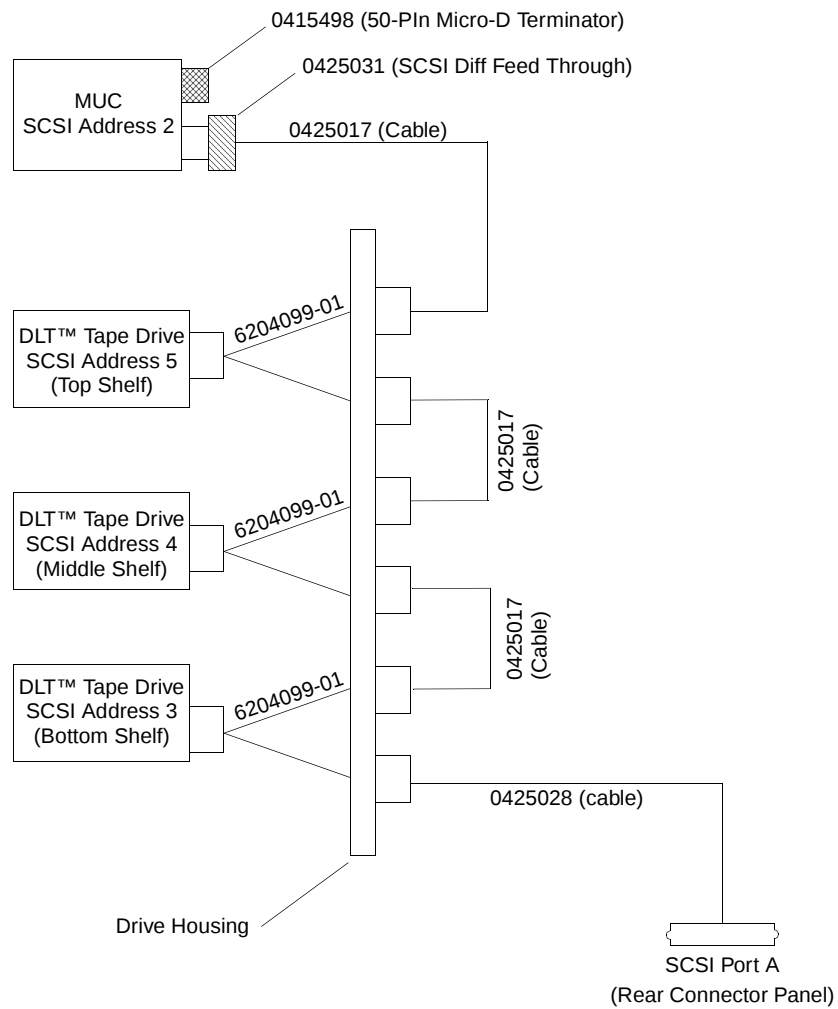
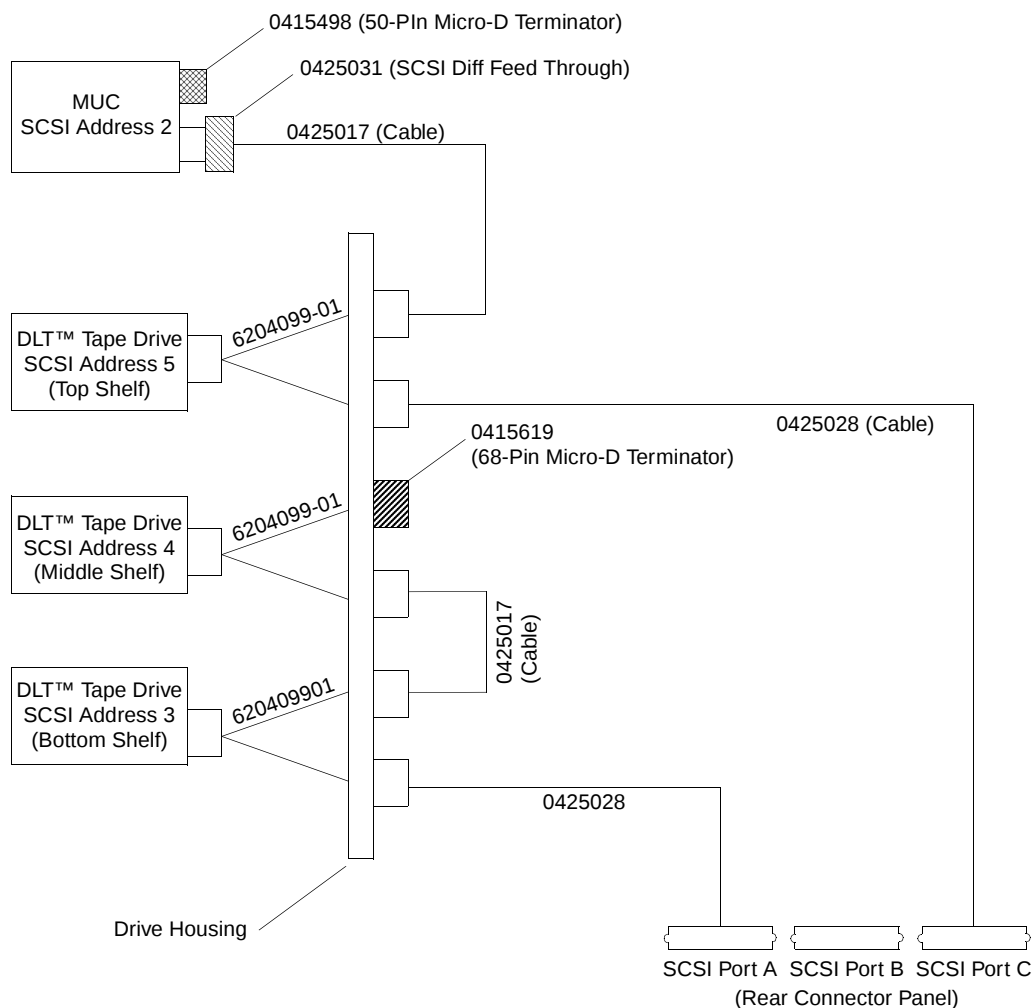


Figure 30 DLT 7000 2-Bus
Configuration (Sample)



External Library Cabling

MUC Cable Connections

The multi-unit controller (MUC) serves two functions:

- It is a SCSI adapter that allows the SCSI interface to control communications between the host and the library.
- It permits the host to control up to five attached library units in a multi-unit configuration.

Libraries with DLT 2000 and DLT 4000 tape drives installed have four 50-pin Centronics SCSI ports labelled: SCSI PORT A, SCSI PORT B, SCSI PORT C, and SCSI PORT 1. See Table 15 and Figure 31 on page -74.

Libraries with DLT™7000 tape drives installed have three 68-pin Micro-D SCSI ports labelled: SCSI PORT A, SCSI PORT B, and SCSI PORT C. See Table 16 and Figure 32 on page -75.

ACL 6/176 SCSI addressing and cabling is shown in Table 17 and Figure 33 on page -76. ACL 9/88 SCSI addressing and cabling is shown in Table 18 and Figure 34 on page -77.

Note: Different SCSI cable configurations are possible. Host SCSI cables are not provided with the library. Refer to Figure 24 on page -66 through Figure 30 on page -72 for information on alternate cabling configurations.

On the rear connector panel, the supplied RS-232C loopback cable (see Figure 31 on page -74) must be connected between the Robotic Controller Port labelled “INPUT” and the Multi-Unit Controller Port labelled “UNIT 0.” This creates a link between the MUC and the library control electronics.

Table 15 ACL2640 SCSI
Port/ID - DLT 2000/DLT 4000
Drives

Library SCSI Port	Device	SCSI ID
1	MUC	2
C	Drive 2 (top)	5
B	Drive 1 (middle)	4
A	Drive 0 (bottom)	3

Figure 31 ACL2640 SCSI
Cabling - DLT 2000/DLT
4000 Drives

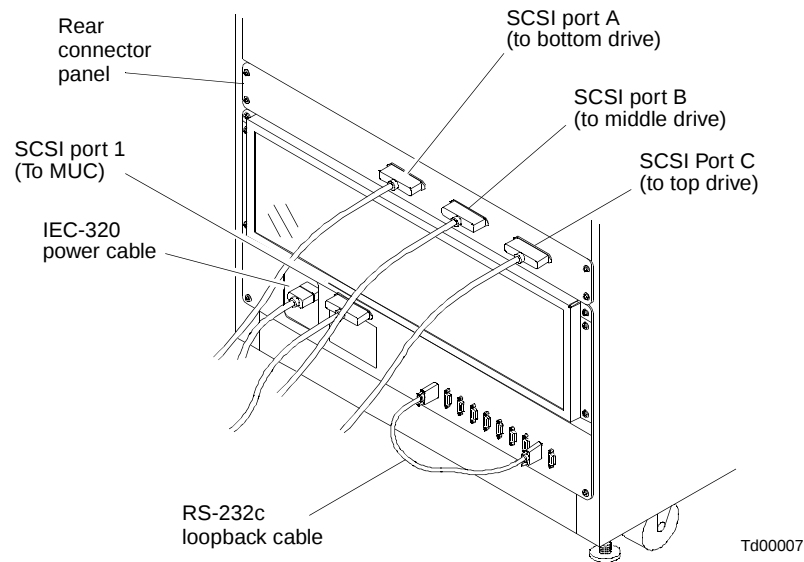


Table 16 ACL2640 SCSI
Port/ID - DLT 7000 Drives

Library SCSI Port	Device	SCSI ID
C	MUC	2
	Drive 2 (top)	5
B	Drive 1	4
A	Drive 0	3

Note: The MUC and drive 2 are daisy-chained together and connected to SCSI port C.

Figure 32 ACL2640 SCSI
Cabling - DLT 7000 Drives

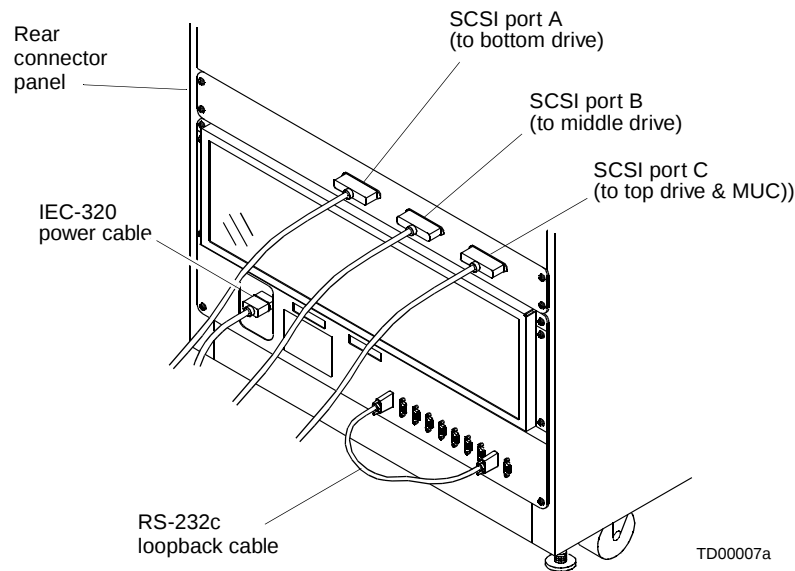


Table 17 ACL 6/176 SCSI
Port/ID - All DLT Drive
Types

Library SCSI Port	Device	SCSI ID
D	MUC	2
	Drive 5 (top)	5
E	Drive 4	4
F	Drive 3	3
A	Drive 2	5
B	Drive 1	4
C	Drive 0 (bottom)	3

Note: The MUC and drive 5 are daisy-chained together and connected to SCSI port D.

Figure 33 ACL 6/176 SCSI
Cabling - All DLT Drive
Types

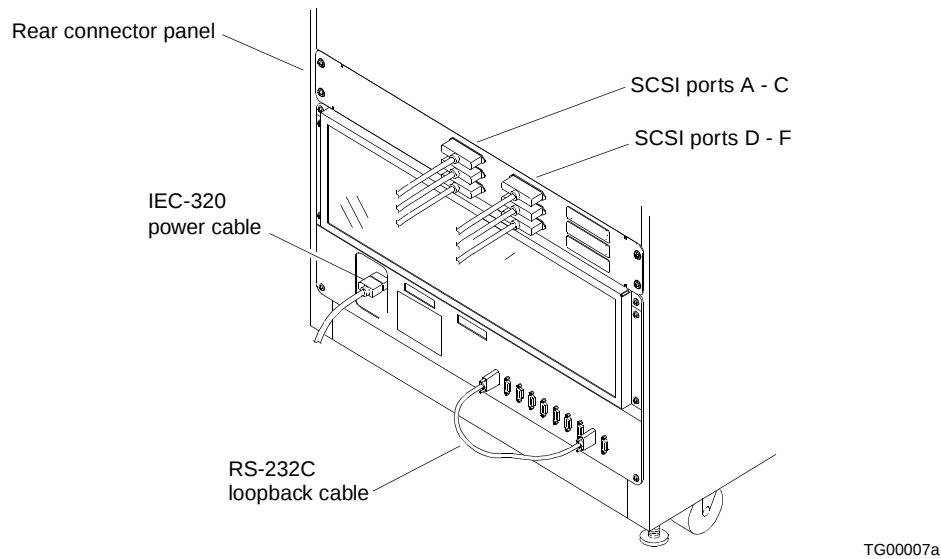
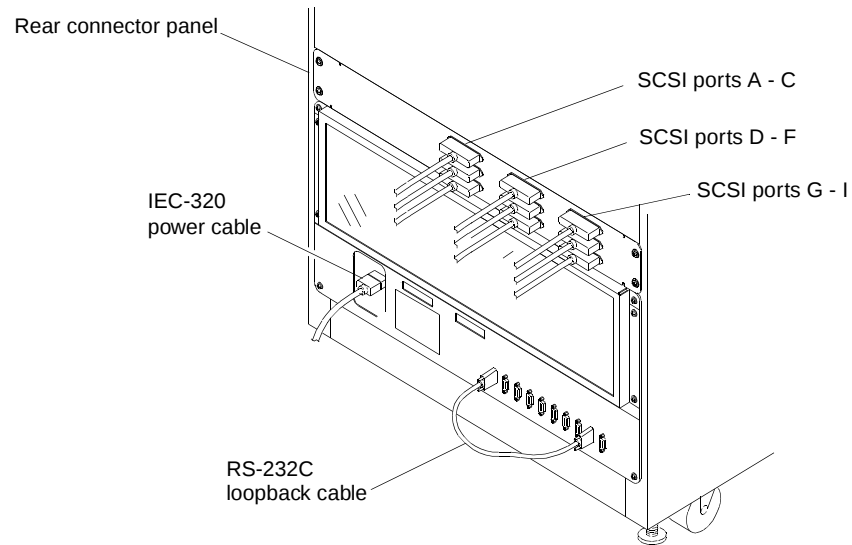


Table 18 ACL 9/88 SCSI
Port/ID - All DLT Drive
Types

Library SCSI Port	Device	SCSI ID
G	MUC	2
	Drive 8 (top)	5
H	Drive 7	4
I	Drive 6	3
D	Drive 5	5
E	Drive 4	4
F	Drive 3	3
A	Drive 2	5
B	Drive 1	4
C	Drive 0	3

Note: The MUC and drive 8 are daisy-chained together and connected to SCSI port G.

Figure 34 ACL 9/88 SCSI
Cabling - All DLT Drive
Types

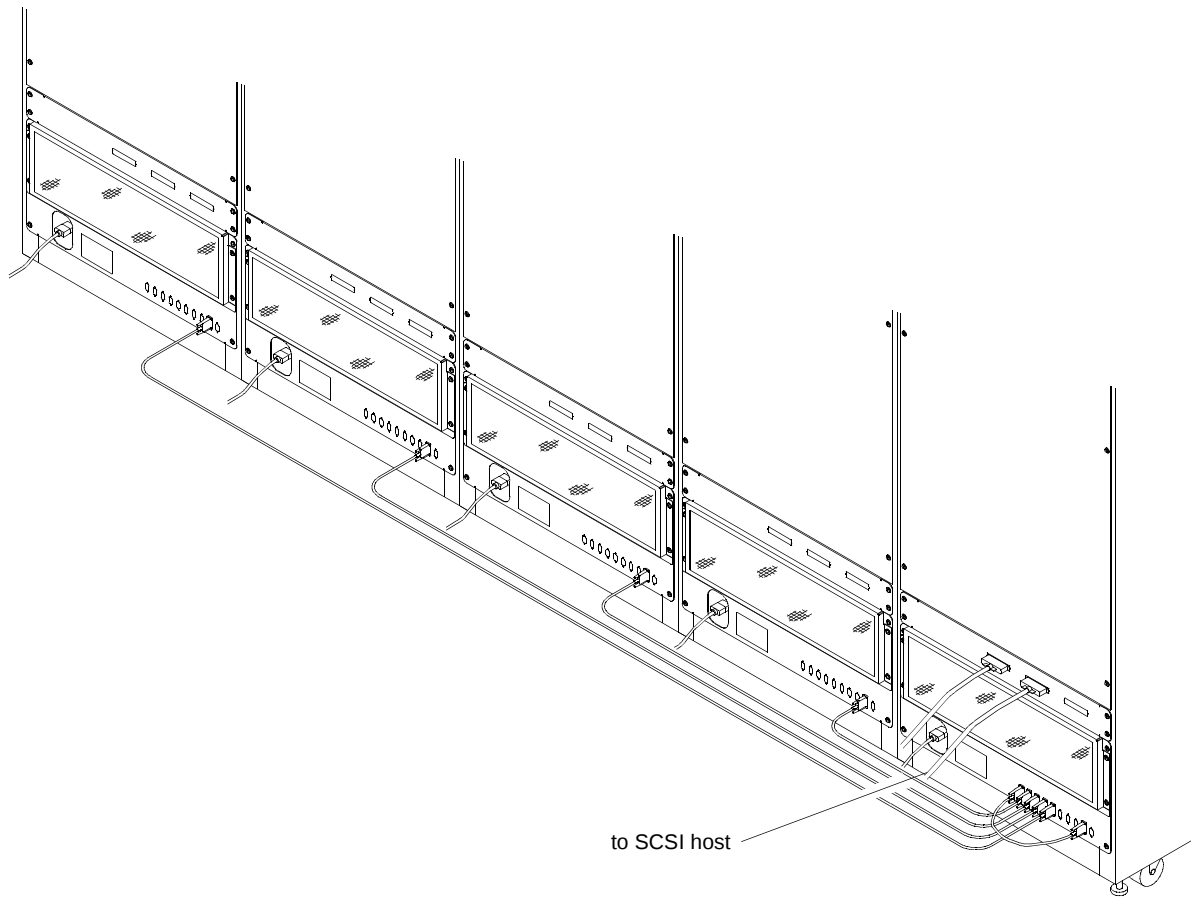


TG00007a

Multi-Unit Library Cable Connections

For multi-unit configurations, the single-unit configuration communications connection procedure is simply extended. Figure 35 shows communications connections between units in a multi-unit library system.

Figure 35 External multi-unit cable connections



Note: The cabinet-to-cabinet connector cables are options and are not supplied with the basic library, but they are supplied with an expansion library.

The multi-unit library system connection functions as follows:

- Provides paths for all necessary control and coordination signals.
- Identifies a unique connection pattern to the MUC software to identify both the number of units in the multi-unit configuration and where each of them are in relation to the others.

Note: The location of the unit housing the MUC is not critical and can be based on proximity to the host computer. For libraries with a MUC that use serial host control, connect the EIA / TIA cable to the Multi Unit Controller host port.

Caution: For the multi-unit library system to function properly, it is important for the units to be in order as unit 0, unit 1, unit 2, and so on, as described below.

Caution: To connect units in multi-unit library system, do the following:

- 1 Connect a cable between the robotic controller port marked “INPUT” on the left-most (as viewed from the front of the library system) cabinet’s rear connector panel and the multi-unit controller port marked “UNIT 0” on the rear connector panel of the library with the MUC.
- 2 Connect a cable between the robotic controller port marked “INPUT” on the second left-most cabinet and the multi-unit controller port marked “UNIT 1” on the library with the MUC.
- 3 Continue this process for the third left-most cabinet, the fourth left-most cabinet, and the right-most cabinet.

Multi-Unit Single-LUN Cable Connections

The multi-unit single-LUN (MUSL) library cable configuration is identical to that of the standard multi-unit communications setup. The MUSL mode must be enabled for the MUC to record the number of units in the MUSL set and the element configuration of each unit. Refer to the “Config Menu” in section 4 of the *ACL2640 Diagnostic User’s Manual*.

Note: All the units in the set must be configured and operational when this command is issued.

Additionally, this command must be issued whenever the library configuration changes, such as when a drive is added. Since the MUC does not contain non-volatile storage, the set configuration is saved in the non-volatile storage of all the units in the set.

Completing the Installation

Once the units have been configured and the library controller connections have been tested, the communications cable between the library and the host computer can be connected on the host side.

Caution: Consult your host computer system administrator or host computer manuals for information before completing the communications connection.

- 1 Connect the host interface cable(s) to the host.
- 2 Release the STANDBY button on the control panel so the library is communicating with the host computer.
- 3 Release the STOP button on the control panel so that the library is fully enabled. (This will start an automatic power up and inventory sequence. When complete, the host will be able to send commands to the library system.)

Note: At this point the library should be operational. For information on operating the library, refer to the *ACL2640 Operator's Guide*. For information on interfacing the library to host computer software, refer to the *ACL2640 Software Interface Guide*.

Glossary

A

ACL2640 library An automated library system developed for storing and handling DLT cartridges.

alignment In the context of this manual, alignment refers to the mechanical adjustments required for successful operation of the library.

alignment toolkit A set of alignment aids available to authorized field service personnel.

automated cartridge library A robotic storage and retrieval system for cartridges.

B

bar code In the context of this manual, the machine-readable label on DLT cartridges.

bar code scan head The portion of the bar code scanner which senses the bar code and is mounted on the vertical carriage.

bin pack A removable rack that stores up to eleven DLT cartridges inside a library. It attaches to the carousel inside a library.

C

calibration In the context of this manual, calibration refers to the software measurements and configuration required for successful operation of the library.

carousel The eight-sided rotating prism in the center of the library which holds bin packs with DLT cartridges.

carousel belt The drive belt connecting the carousel motor / gearbox to the carousel.

carousel face One side of the eight-sided carousel.

control panel The panel containing the display, fault light, and control buttons on the front door of the library.

D

door interconnect board The electronics board located on the front door to which the cables crossing the hinge are connected.

E

EIA/TIA-574 A serial communications cabling and protocol standard for nine-pin connectors, sometimes referred to as RS-232.

electronics module The metal enclosure holding the logic power supply and the robotic control and actuator driver electronics.

extension axis assembly Mounted onto the vertical axis, the extension axis assembly consists of the gripper assembly and the horizontal axis on which the gripper assembly is mounted.

extension axis belt The drive belt connecting the extension motor / gearbox to the gripper.

F

FCC Class A Standard established by the U.S. Federal Communications Commission governing electromagnetic emissions.

FSE Field Service Engineer, a.k.a., FE (Field Engineer).

G

gripper assembly The assembly which mounts on the extension axis and grips cartridges; sometimes called the gripper.

H

host Host computer.

host computer The computer which issues high-level pick and place commands to control the library.

I

IOD The Inport / Outport Device, located at the cutout on the left side of the library, allows insertion and removal of single cartridges into and out of the library.

L

LED Light Emitting Diode.

library A single cabinet and the robotics therein.

M

mounting kit Kits supplied with libraries for installing tape drive systems in the unit.

MTBF Mean Time Between Failures.

MTTR Mean Time To Repair.

MUC The Multi-Unit Controller serves two functions. It is a SCSI adapter and it permits the library host computer to control up to five attached basic or expansion libraries.

MUSL The Multi-Unit Single-LUN is a software selected feature to externally interface up to five mid-range libraries units as a single logical unit.

O

online Ready for communication with a host computer.

P

PC Personal Computer.

pick The act of removing a cartridge from one location in preparation for placing it in another location.

place The act of placing a cartridge in a location after it has been picked from another location.

power distribution box A box located in the left rear of the cabinet which contains receptacles for providing power to the various components of the library and switches for turning the power on and off.

PTM The Pass-Through Mechanism is the motor-driven, high-speed conveyor that transports cartridges between adjacent libraries in a multi-unit tape library. It is used in

conjunction with the IOD when importing or exporting single cartridges.

PROM Programmable Read-Only Memory.

R	rear connector panel Located at the bottom rear of the cabinet, the rear connector panel contains the fans and the connectors for attaching external cabling to the library.
S	SCSI Small Computer System Interface. Communications standard for attaching peripheral equipment to computers.
T	tape drive The mechanism that reads and writes data from and to a tape. tape drive alignment cartridge An alignment aid in the general form of a DLT cartridge which has flanges to keep it from being stuck in a drive.
U	UL Underwriters Laboratories.
V	vertical belt The drive belt connecting the vertical motor to the vertical axis assembly. vertical carriage assembly The crossbar and linear bearings mounted onto the vertical rails and everything mounted on the crossbar.
Z	ZIF connector A Zero Insertion Force connector used for electrical wiring.

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